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FORTY-SEVENTH ANNUAL REPORT

OF THE

COMMISSIONER

OF THE

MICHIGAN DEPARTMENT OF HEALTH

FOR THE

FISCAL YEAR ENDING JUNE 30, 1919

FORT WAYNE PRINTING COMPANY
CONTRACTORS FOR MICHIGAN STATE PRINTING AND BINDING
FORT WAYNE, INDIANA
1920

LETTER OF TRANSMITTAL.

Office of
Commissioner of the Michigan Department of Health,
Lansing, Michigan, July 1, 1919.

To the Honorable Albert E. Sleeper, Governor of Michigan:

SIR:—In compliance with Sections 5 of Act 81, P. A. 1873, as amended by Act 18, P. A. 1905, being Section 4992, Compiled Laws of 1915, of the laws governing this department, I have the honor to herewith submit the annual report for the fiscal year ending June 30, 1919.

Very respectfully,

R. M. OLIN, M. D.,

State Health Commissioner.

PERSONNEL

OF THE

MICHIGAN DEPARTMENT OF HEALTH.

Richard M. Olin, M. D., *Commissioner.*
Henry L. Oakley, *Deputy Commissioner.*

COUNCIL.

	Term Expires.
Guy L. Kiefer, M. D., *President,* Detroit	1925.
James G. Turner, M. D., *Vice-President,* Houghton	1925.
C. C. Slemons, M. D., Grand Rapids	1923.
Frank M. Gowdy, M. D., St. Joseph	1923.
Leland W. Carr, Lansing	1921.

Bureau of Engineering—
- E. D. Rich, State Sanitary Engineer.
- W. C. Hirn, Assistant.
- J. R. Daugherty, Assistant.
- J. M. Hepler, Assistant.
- A. H. Jewell, Assistant.

Bureau of Veneral Diseases—
- G. M. Byington, M. D., Director.
- Katharin Ostrander, Director Social Service.
- Marjorie Delavan, Director of Education.

Bureau of Laboratories—
- C. C. Young, Director.
- E. R. Chambers, Bacteriologist.
- C. L. Bliss, Chemist.
- J. A. Berry, Serologist.
- Jessie Godfrey, Assistant Serologist.
- Ethel White, Assistant Serologist.
- Minna Crooks, Bacteriologist.
- Ruth Normington, Assistant Bacteriologist.
- Frances Hawkins, Assistant Bacteriologist.
- P. C. Yull, Assistant Bacteriologist.

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PART I.

REPORT OF THE COMMISSIONER FOR THE FISCAL YEAR JULY 1, 1918, TO JUNE 30, 1919

NEW PUBLIC HEALTH LAW.

The Legislature of 1919 passed a law to abolish the State Board of Health. The act provides that the Governor with the advice and consent of the Senate shall appoint a State Health Commissioner. This officer will have general charge, supervision and enforcement of the health laws of the state. A council of five constitutes an "advisory" body. This action was taken in accordance with the trend of public opinion concerning the centralizing of responsibility in municipal governments and public health matters. In accordance with the provisions of the act, the Governor appointed Dr. Richard M. Olin, State Health Commissioner, and the following persons as members of the Advisory Council: Dr. Guy L. Kiefer, Detroit; Dr. James G. Turner, Houghton; Dr. C. C. Slemons, Grand Rapids; Dr. Frank M. Gowdy, St. Joseph, and Attorney Leland W. Carr, Lansing.

The full text of the law follows:

AN ACT

To protect the public health; to provide for the appointment of a State Health Commissioner, Deputy State Health Commissioner and State Advisory Council of Health; to prescribe the compensation, powers and duties thereof, the powers and duties of township, village and city health officers and health boards; and to abolish the State Board of Health.

The People of the State of Michigan enact:

Section 1. Immediately upon the taking effect hereof, the Governor shall, with the advice and consent of the Senate, appoint a State Health Commissioner, who shall assume office as soon as may be and shall continue therein to and including the thirtieth day of June, nineteen hundred and twenty-three. The successors of said commissioner shall be appointed by the Governor, with the advice and consent of the Senate, for terms of four years, beginning on the first day of July, nineteen hundred twenty-three, and each four years thereafter: Provided, however, That any commissioner shall hold office until his successor is appointed and qualified. No person shall be appointed to the office of Health Commissioner unless he shall be a registered physician and shall have had at least five years' experience as a practicing physician, or in lieu of such experience shall have the degree of doctor of public health or its equivalent.

Sec. 2. The State Health Commissioner shall have general charge and supervision of the enforcement of the health laws of the State of Michigan and shall have the specific powers and duties hereinafter expressed. He shall be subject to removal by the Governor for cause after due notice and hearing. He shall receive an annual salary of forty-five hundred dollars per annum payable in the same manner as are the salaries of other State officials and shall devote his entire time to the performance of the duties of his office.

Sec. 3. The State Health Commissioner may appoint a deputy who shall be a registered physician or who shall hold the degree of doctor of public health or its equivalent, for whose acts the commissioner shall be responsible and who shall perform such duties in connection with the enforcement of the health laws of the State as may be assigned to him by the commissioner. During the illness, absence or disability of the State Health Commissioner, the deputy may execute all the duties of said office. He shall receive an annual salary of twenty-five hundred dollars to be paid in the same manner and at the same time as the salaries of other State officers are paid. The appointment of the deputy may be revoked at any time by the commissioner. He shall qualify by taking and filing the constitutional oath of office and by executing and filing with the commissioner such bond as the commissioner may require from him.

Sec. 4. The State Health Commissioner shall exercise all of the powers and perform all of the duties now vested by law in the State Board of Health or in any member, committee or officer thereof, including the secretary, subject to the provisions of this act. The State Board of Health is hereby abolished: Provided, however, That the rules, regulations and ordinances of said board, heretofore regularly adopted thereby and in force at the time of the passage of this act, shall be and remain in force and effect unless and until the same shall be altered, modified or repealed in accordance herewith. Such orders, regulations and ordinances shall be deemed to be, and shall have, the same force and effect as orders, regulations and ordinances made or adopted hereunder by said commissioner with the advice and consent of the Advisory Council of Health.

Sec. 5. Immediately upon the taking effect hereof, the Governor shall appoint five persons, with the consent of the Senate, who shall constitute the State Council of Health. In the first instance, the term of one member so appointed shall expire on the thirtieth day of June, nineteen hundred twenty-one; the term of two members shall expire on the thirtieth day of June, nineteen hundred twenty-three; and the term of two members shall expire on the thirtieth day of June, nineteen hundred twenty-five. The Governor shall indicate in his commissions, the term for which each said member is appointed. The members of said council shall be entitled to their actual expenses incurred in performing the duties of their office and to the sum of ten dollars per day while attending meetings of the council. The council shall convene on the call of the State Health Commissioner, providing they shall have at least four regular meetings each year, to be held at such times and places as the council may by its resolution fix. Except as herein provided, the duties of said council shall be advisory only. Upon the expiration of the term of office of each member, the Governor shall appoint a successor who shall assume office on the first day of July following the appointment and shall hold the same for a term of six years and until his successor is appointed and qualified.

Sec. 6. The State Health Commissioner, and each member of the council appointed in accordance with the preceding section, shall, before entering on the performance of the duties of his office, take the constitutional oath of office and file the same in the office of the Secretary of State. The Health Commissioner shall also give a bond to the People of the State of Michigan in the sum of ten thousand dollars for the faithful performance of the duties of his office and for the proper accounting of such moneys as may come into his possession by virtue of his office.

Sec. 7. With the concurrence of the State Council of Health, any three of whom shall constitute a quorum, the State Health Commissioner may make and declare rules and regulations in accordance with the laws of the State for the proper safeguarding of the public health and for preventing the spread of diseases, or the existence of sources of contamination. Such rules and regulations shall be published in such manner as may be directed by the Advisory Council of Health.

Sec. 8. Whenever in the opinion of the State Health Commissioner, conditions found by him to exist in any township, village or city of the State are such as to constitute a menace to the public health, either within or without the limits of such municipality, such commissioner may by himself, or by his deputy, or medical inspector, enter such township, village or city and take full charge of the administration of the health laws, rules, regulations and ordinances applicable thereto: Provided, however, That said commissioner shall not act hereunder in any city maintaining a health department with a full-time health office, except with the consent of the Advisory Council of Health.

Sec. 9. In case of an epidemic of any infectious or dangerous communicable disease within this State or any community thereof, the State Health Commissioner may, if he deem it necessary to protect the public health, forbid the holding of public meetings of any nature whatsoever except church services which may be restricted as to number in attendance at one time, in said community, or may limit the right to hold such meetings in his discretion. Such action shall not be taken, however, without the consent and approval of the Advisory Council of Health. Any order made pursuant to this section shall be published in such a manner as the Advisory Council of Health may direct and shall become effective at a date specified in said order. Such order shall be signed by the Health Commissioner and if applicable to the entire State be countersigned by the Governor.

Sec. 10. The State Health Commissioner may appoint such clerical assistants as may be necessary to enable him to perform the duties hereby imposed, or imposed by any other law of the State. It shall be the duty of the Board of Auditors to provide suitable quarters and facilities for the accommodation of the State Health Commissioner and the health department. All salaries and expenses incurred under this act shall be paid out of the amount specifically appropriated for the purpose of carrying out the provisions of this act with the approval of the State Health Commissioner.

Sec. 11. Subject to the provisions of this act, all city, village and township health officers, health board and health departments shall respectively perform the duties and exercise the powers now imposed and granted by law. It shall be the duty of all local health officials to cooperate in every way possible with the State Health Commissioner and the State Advisory Council of Health. Wilful failure to do so shall be deemed to be misfeasance in office.

Sec. 12. Any person violating any regulation, rule or order of the State Health Commissioner, or of the State Health Commissioner and the State Advisory Council of Health, shall be deemed to be guilty of a misdemeanor and on conviction thereof shall be subject to a fine of not more than two hundred dollars or to imprisonment in the county jail not more than six months, or to both such fine and imprisonment in the discretion of the court. Nothing in this act shall be construed or operate to empower or authorize the State Commissioner of Health, or any health officer, or their representatives, to restrict in any manner the individual's right to select the physician or mode of treatment of his choice: Provided, That sanitary laws and the laws, rules and regulations relating to infectious and contagious diseases are complied with.

This act is ordered to take immediate effect.

EXTRACTS OF MINUTES OF BOARD MEETINGS.

REGULAR MEETING, DETROIT, JULY 22, 1918.

The regular meeting was called on July 12, 1918, at which time no quorum was present. Meeting adjourned to July 22. The adjourned quarterly meeting of the State Board of Health was held in the office of Dr. Guy L. Kiefer, Detroit, July 22, at 8 P. M.

Members present: Drs. Kiefer, Biddle and Olin and Mr. Farley.

Professor Rich, State Sanitary Engineer, recommended that the State Board of Health authorize the placarding of municipalities within the state having water supplies which are known to be unsafe for drinking purposes and dangerous to the public health. Such signs should be placed in all public or semi-private buildings and on the streets near drinking fountains and on the main roads entering the municipality for the information of traveleres arriving by automobile. Arrangements should be made to apprehend and punish any person defacing or removing such sign.

Moved by Dr. Biddle and supported by Mr. Farley that a committee consisting of the vice-president and secretary be instructed to investigate the applications of the several county sanatoria for state aid under section 5 of Act 237, Public Acts of 1917. Carried.

SPECIAL MEETING, DETROIT, JULY 30, 1918.

Meeting called to order in the Detroit Board of Health assembly room at 10 A. M. by Dr. Kiefer.

Members present: Drs. Kiefer, Biddle and Olin.

Dr. Kiefer announced that the object of the meeting was to discuss the matter of the water supply with the officials of Wyandotte. Dr. Lambert and Mr. Sutliff, members of the city commission, and Julius Thediej, city attorney, appeared for the city of Wyandotte. Dr. Kiefer called upon Edward D. Rich, State Sanitary Engineer, for a statement of the steps that had already been taken to bring to the attention of the Wyandotte officials the necessity for pure water supply. Mr. Rich outlined these steps. After some discussion it was agreed that the question of submitting a bond issue for water works improvements and water filtration should be placed before the next regular meeting of the Wyandotte commission to be held August 6, with a recommendation that the matter be submitted to the people at the November election, or at a special election as soon as possible, and the action of the commission reported to the State Board of Health.

SPECIAL MEETING, DETROIT, OCTOBER 2, 1918.

Meeting called to order at the office of the City Board of Health at 10 A. M.

Members present: Col. Victor C. Vaughan, Drs. Biddle, Kiefer and Olin.

Col. Vaughan called upon Dr. Hubbell to describe the Detroit sewer plant, also called upon Dr. Frenchel, water commissioner, and Drs. Inches and Kiefer for remarks. After much discussion, Mr. Walker, Assistant

Health Officer of Detroit, took the Board to view the mouth of Connor's Creek and the situation where Connor's Creek empties into the Detroit River, after which the board by a unanimous vote passed a resolution which appears upon the records of the Board on Page 236.

The activities of the Venereal Division of the State Board of Health were reviewed by the Secretary, who made a complete report on the activities of that Division.

The epidemic of Spanish influenza was considered and discussed at great length. Upon motion of Dr. Biddle, supported by Dr. Kiefer, Spanish influenza was declared a dangerous communicable disease, and the Secretary was instructed to get out a poster for exhibition in public places on this subject.

SPECIAL MEETING, DETROIT, DECEMBER 19, 1918.

The Board convened in the office of Dr. Kiefer, and was called to order by Acting President, Dr. Kiefer, at 8 P. M.

Other members present: Drs. Biddle and Olin.

Mr. Carr, Assistant Attorney General of Michigan, was present in an advisory capacity.

Dr. Olin stated that the meeting was called for the purpose of considering and formulating bills which the Board would present at the coming session of the State Legislature.

SPECIAL MEETING, LANSING, FEBRURARY 21, 1919.

Meeting called to order at 8 P. M. in the office of the Secretary, President, Col. Victor C. Vaughan, presiding.

Other members present: Drs. Guy L. Kiefer, Andrew P. Biddle, J. G. Turner, and R. M. Olin.

The Secretary presented to the Board House Bill No. 28 on the reorganization of the State Board of Health for further consideration. No suggestions were offered.

The Secretary reported to the Board the resignation of Dr. A. A. Spoor, bacteriologist, and that he had upon the recommendation of Prof. E. D. Rich appointed Lieut. C. C. Young of the faculty of the Kansas State University bacteriologist for the State Board of Health at Lansing. Moved by Dr. Biddle, supported by Dr. Kiefer, that the appointment of Lieut. Young as state bacteriologist at Lansing be confirmed. Carried.

The Secretary next introduced to the Board the Director of the Venereal Disease Division of the State Board of Health, Dr. G. M. Byington, the Director of the Social Service of that Division, Miss Katharin Ostrander, and the Director of the Educational Branch, Miss Marjorie Delavan. Each of these persons outlined to the Board the work in their respective divisions.

REGULAR MEETING, ADVISORY COUNCIL OF HEALTH, LANSING, MAY 6, 1919.

The first regular meeting of the Advisory Council of Health convened at 10:30 A. M. in the office of Dr. R. M. Olin, Commissioner. Dr. James G. Turner acted as temporary chairman.

Other members present: Drs. Guy L. Kiefer, C. C. Slemons, F. M. Gowdy.

The chairman stated to the Council that election of officers was in order and the following action was taken: Moved by Dr. Slemons, supported by Dr. Gowdy, that Dr. Guy L. Kiefer be elected president of the Advisory Council of Health for the ensuing year. Carried.

Moved by Dr. Slemons, supported by Dr. Gowdy, that Dr. James G. Turner be elected vice-president of the Advisory Council of Health for the ensuing year. Carried.

The Council then gave its attention to the subject of the revision of the rules and regulations in relation to communicable diseases, and after a general discussion, decided that the several members should keep the subject under consideration and report their suggestions to the Commissioner at the next meeting.

The Commissioner then introduced to the Council Dr. Byington, Miss Ostrander and Miss Delavan, who outlined to the Council the work of their divisions.

Moved by Dr. Slemons, supported by Dr. Gowdy, that the next meeting of the Council be held in Houghton, August 26, 1919.

EXAMINATION AND LICENSING OF EMBALMERS.

Under the provisions of Act No. 132, Laws of 1903, two examinations were held during the year ending June 30, 1919, as follows:

Lansing, November 12, 13 and 14, 1918. Lansing, June 24, 25 and 26, 1919.

Of the 117 persons examined, 97 were granted licenses.

Reciprocal licenses were granted in 5 instances.

A statement of expenses incurred in the operation of Act 132 may be found on a subsequent page of this report.

The following letter, issued in October, 1918, will serve to show the scope of the embalmers' examination, and the conditions to be complied with on the part of the applicants for examination:

STATE BOARD OF HEALTH.

OFFICE OF THE SECRETARY, LANSING.

To the Funeral Directors and Embalmers.

Gentlemen:—

You are hereby informed that a meeting of the State Board of Health, called for the purpose of conducting an Embalmers' Examination, will be held in the city of Lansing, October 31, November 1 and 2, in Senate Chamber. The examination will commence at 9 o'clock, Tuesday morning, October 31.

Candidates will be required to take both *written* and *oral* examinations with demonstrations on the cadaver. Oral examinations will be given in the order applications are received. Some of the general subjects included in the written examination are:

(a) Visceral anatomy and the circulation of the human body, both arterial and venous.

(b) The nature, action, modes of action and comparative value of disinfectants.

(c) The methods of embalming and preparing bodies for transportation, also shipping rules.

(d) How diseases are spread, the best method for the restriction of diseases and bacteriology in relation to the spread of diseases.

(e) The signs of death and the manner in which it is determined.

Those who desire to take the examination at this time, must fill out and return to the Secretary of the Board, the enclosed application blank, with an unmounted photograph of the applicant, signed in ink on the back and properly certified to by a notary. A fee of five dollars must accompany the application. Remittances may be made by express or postoffice money order, or by registered letter. *Personal checks cannot be used.*

Applications should be on file in this office *thirty days* before the date of examination.

Application must be made in the name of an individual, and not of a firm.

Applicant's name must be signed in full.

In the examination, a rating of at least seventy-five per cent must be made by the applicant to secure a license.

By direction of the State Board of Health.

RICHARD M. OLIN, M. D.,
Secretary.

GENERAL AND SPECIAL WORK IN THE OFFICE OF THE COMMISSIONER.

Much of the general work of the office naturally groups itself under three heads: the collection of information, the compilation of information so collected, and the dissemination of such information as will be of service in the restriction and prevention of disease.

COLLECTION OF INFORMATION.

As the local health officer is the principal medium by which this Department may reach and instruct the public in matters pertaining to the prevention of sickness and deaths, the appointment, and the return of the names and postoffice addresses of the health officers, in each year, are matters of more than ordinary interest and importance.

In each year, it is often necessary to make a first, second and third request for information which will place this office in communication with the local health officers, and during the time which is thus used up in corresponding and waiting, an outbreak of a dangerous disease may begin and become widespread before this office can afford the usual assistance to the proper officials in the locality.

It should be said, however, that there is an increasing tendency to comply with the law in this particular, and local boards of health now generally act promptly and co-operate cordially with this Department for the suppression of disease.

Having established communication with the newly appointed local health officers, pamphlets and other publications which may aid them in their work, together with the usual blanks for reports of outbreaks of diseases in their locality, are mailed from this Department. In some instances, considerable correspondence is necessary to instruct the health officials how to properly care for sick and infected persons, and to make reports which will be of value in the compilations for the annual reports and other publications of this Department.

In addition to the collection of the usual information relative to outbreaks of dangerous communicable diseases in this State, special information upon subjects of public interest and importance, is sometimes asked for and is usually cheerfully furnished by a large number of health officers and other persons from whom the information is sought.

DISSEMINATION OF INFORMATION.

As stated in the preceding paragraph, each newly appointed health officer is supplied, by this office, with information relative to his duties. This information is contained principally in pamphlets covering the principal points in the etiology and methods of restriction and prevention of each of the dangerous communicable diseases.

Upon the receipt of information relative to an outbreak of a dangerous communicable disease, in addition to the usual instructions and blanks for making the reports, there are mailed to the health officers a sufficient number of pamphlets, relative to the particular disease then present, for distribution to the families and immediate neighbors of the sick person. In this way the people are educated as to their duty, under the law, and their co-operation with the local health officers often secured.

A pamphlet covering the law respecting nuisances, and containing information relative to their suppression, is published and distributed among those persons directly interested, when a complaint of a nuisance is made to this office.

A pamphlet, giving the law and regulations of this Department, respecting the preparation and shipment of dead bodies, is published, and distributed among the licensed embalmers, railroad officials, and other persons interested in the transportation of the dead.

ANNUAL REPORTS.

About 1,500 copies of the annual report are published each year and are distributed among the following:

Members and ex-members of the State Board of Health; secretaries of state, territorial and provincial boards of health; sanitary journal exchanges; library exchanges.

PUBLIC HEALTH BULLETINS.

Beginning with the fiscal year, July 1, 1913, the quarterly bulletins were discontinued, and a monthly publication, greatly enlarged, covering various topics, directly and indirectly, pertaining to all public health questions intended for the general public, is now being issued instead. Copies of this publication, *Public Health,* may be obtained upon request.

ENGINEERING BULLETINS.

The following list of bulletins have been issued by the Bureau of Engineering, copies of which may be had on application to this office:

No. 1. Never issued.
No. 2. Sewage Disposal for Single Houses and Small Institutions.
No. 3. How to Construct a Sanitary Dry Earth Closet. (About out of print and will not be reprinted).
No. 4. The Michigan Water and Sewerage Law, and the Grand Rapids Stream Pollution Decision.
No. 5. Chemical Closet.
No. 6. Garbage Collection and Disposal. (About out of print and will not be reprinted).
No. 7. Monroe Typhoid Fever.
No. 8. Sanitary Privy.
No. 9. Water Filtration.
No. 10. Water Chlorination.
No. 11. Sewage Disposal.
No. 12. The Public Water Supplies and Sewer Systems of Michigan.

INVESTIGATIONS MADE BY STATE MEDICAL INSPECTORS.

FROM JULY 1, 1918, TO JULY 1, 1919.

Norway, August 15. Investigation of smallpox by Dr. A. J. Carlson.

Spaulding, August 20. Investigation of smallpox by Dr. Robt. G. Marriner.

Cedar Lodge, August 23. Investigation of meningitis by Dr. G. A. Holliday.

Hudson, July 29. Investigation of communicable disease by Dr. Walter H. Sawyer.

Odessa Township, Ionia County, August 28. Investigation of smallpox by C. C. Slemons.

Buchanan, August 24. Investigation of communicable disease by Dr. C. N. Sowers.

Owosso, July 29. Investigation of infantile paralysis by Dr. Arthur M. Hume.

Hazelton Township, Shiawassee County, September 1. Investigation of infantile paralysis by Dr. Arthur M. Hume.

Glen Arbor, September 5. Investigation of scarlet fever and measles by Dr. G. A. Holliday.

Birch Creek, September 26. Investigation of smallpox by Dr. Robert G. Marriner.

Ingallston, September 26. Investigation of smallpox by Dr. Robert G. Marriner.

Bennington, September 7. Investigation of infantile paralysis by Dr. A. M. Hume.

Northville, October 14. Inspection of school children by Dr. George Sewell.

Menominee, September 25. Investigation of smallpox by Dr. Robert G. Marriner.

Richland Township, Kalamazoo County, July 6 and 13. Investigation of smallpox by Dr. A. H. Rockwell.

Otsego, July 14. Investigation of smallpox by Dr. A. H. Rockwell.

Dowagiac, November 25. Investigation of smallpox by Dr. A. H. Rockwell.

Alma, October 22. Investigation of contagious diseases by Dr. Arthur M. Hume.

Owosso, November 3 and 5. Investigation of smallpox by Dr. Arthur M. Hume.

Morenci, December 18. Investigation of influenza by Dr. Walter H. Sawyer.

Niles, February 7. Investigation of occupational diseases by Dr. C. N. Sowers.

Three Oaks, December 13. Investigation of influenza by Dr. C. N. Sowers.

Royalton, February 8. Investigation of scarlet fever by Dr. C. N. Sowers.

New Buffalo, March 2. Investigation of smallpox by Dr. C. N. Sowers.

Galien, March 25. Investigation of smallpox by Dr. C. N. Sowers.

Cedar Springs, October 30 to November 2. Investigation of influenza by Dr. W. G. Ramsey.

Rockford, November 26. Investigation of influenza by Dr. J. D. Brook.

Richmond, March 6. Investigation of smallpox by Dr. W. H. Smith.

Benton Harbor, June 25. Investigation of leprosy case by Dr. H. L. Wright.

East Jordan, July 3. Investigation of scarlet fever by Dr. C. H. Murphy.

St. Johns, July 10. Investigation of smallpox by Dr. C. H. Murphy.

Battle Creek, July 11 and 12. Investigation of smallpox by Dr. C. H. Murphy.

Ludington, July 12. Investigation of infantile paralysis by Dr. C. H. Murphy.

East Lansing, July 22. Investigation of smallpox by Dr. C. H. Murphy.

Leslie, July 23. Investigation of smallpox by Dr. C. H. Murphy.

Otsego, July 24. Investigation of milk supply by Dr. C. H. Murphy.

Allegan, July 24. Investigation of milk supply by Dr. C. H. Murphy.

West Branch, July 29. Investigation of anterior poliomyelitis by Dr. C. H. Murphy.

Remus, July 30. Investigation of smallpox by Dr. S. R. Hill.

Marilla, September 3. Investigation of smallpox by Dr. S. R. Hill.

Owosso, September 6. Investigation of infantile paralysis by Dr. S. R. Hill.

Midland, September 6. Investigation of smallpox by Dr. S. R. Hill.

Allen School House, Clinton County, September 10. Investigation of infantile paralysis by Dr. S. R. Hill.

Maple Grove Township, Barry County, September 13. Investigation of contagious diseases by Dr. S. R. Hill.

Burr Oak, September 16. Investigation of insanitary conditions by Dr. S. R. Hill.

Roscommon, September 21. Investigation of diphtheria by Dr. S. R. Hill.

Bancroft, September 26. Investigation of smallpox by Dr. S. R. Hill.

Antrim Township, Shiawassee County, September 26. Investigation of smallpox by Dr. S. R. Hill.

Shiawassee Township, Shiawassee County, September 26. Investigation of smallpox by Dr. S. R. Hill.

Comins Township, Oscoda County, September 29. Investigation of diphtheria by Dr. S. R. Hill.

St. Louis, October 2. Investigation of infantile paralysis by Dr. S. R. Hill.

Roscommon, October 3. Investigation of diphtheria by Dr. S. R. Hill.

Freeland, October 4. Investigation of quarantine and placarding by Dr. S. R. Hill.

Rollin Township, Lenawee County, October 9. Investigation of smallpox by Dr. S. R. Hill.

Rome Township, Lenawee County, October 9. Investigation of smallpox by Dr. S. R. Hill.

Broomfield Township, Mecosta County, October 10. Investigation of diphtheria by Dr. S. R. Hill.

Petoskey, October 14. Investigation of influenza by Dr. S. R. Hill.

Lyons, November 18. Investigation of smallpox by Dr. S. R. Hill.

White Pigeon, November 19. Investigation of scarlet fever by Dr. S. R. Hill.

Marion, November 21. Investigation of influenza and typhoid fever by Dr. S. R. Hill.

Bay City, November 23. Investigation of influenza by Dr. S. R. Hill.

Shelby, November 30. Investigation of scarlet fever by Dr. S. R. Hill.

Benona Township, Oceana County, November 30. Investigation of scarlet fever by Dr. S. R. Hill.

Grant Township, Oceana County, November 30. Investigation of scarlet fever by Dr. S. R. Hill.

Crystal Township, Oceana County, November 30. Investigation of scarlet fever by Dr. S. R. Hill.

Shelby Township, Oceana County, November 30. Investigation of scarlet fever by Dr. S. R. Hill.

Albion, December 2 and 3. Investigation of influenza by Dr. S. R. Hill.

Adrian, December 4. Investigation of smallpox by Dr. S. R. Hill.

Caro, December 7 and 8. Investigation of influenza by Dr. S. R. Hill.

Unionville, December 8. Investigation of influenza by Dr. S. R. Hill.

St. Joseph, December 10. Investigation of influenza by Dr. S. R. Hill.

Palo, December 13 and 14. Investigation of smallpox by Dr. S. R. Hill.

Three Oaks, December 15 and 16. Investigation of influenza by Dr. S. R. Hill.

Benton Harbor, December 17. Investigation of influenza by Dr. S. R. Hill.

Owosso, December 18. Investigation of influenza by Dr. S. R. Hill.

Bancroft, December 18 and 19. Investigation of influenza by Dr. S. R. Hill.

Lyons, December 19. Investigation of smallpox by Dr. S. R. Hill.

Marshall, December 21. Investigation of influenza by Dr. S. R. Hill.

Traverse City, December 30 and 31. Investigation of influenza and sewerage by Dr. S. R. Hill.

Munising, January 3 and 4. Investigation of influenza by Dr. S. R. Hill.

Houghton County, January 5, 6 and 7. Investigation of influenza by Dr. S. R. Hill.

Millbrook, January 9 and 10. Investigation of influenza and pneumonia by Dr. S. R. Hill.

Onaway, January 11. Investigation of influenza by Dr. S. R. Hill.

Traverse City, January 11 to February 5. Investigation of influenza by Dr. S. R. Hill.

Leelanau County, January 11 to February 5. Investigation of influenza by Dr. S. R. Hill.

Three Rivers, February 7. Investigation of influenza and pneumonia by Dr. S. R. Hill.

Grand Junction, February 10. Investigation of typhoid fever by Dr. S. R. Hill.

Winn, February 14 and 15. Investigation of scarlet fever by Dr. S. R. Hill.

Holly, February 17 and 18. Investigation of smallpox by Dr. S. R. Hill.

Capac, February 26, 27 and 28. Investigation of influenza by Dr. S. R. Hill.

Ontonagon, March 1 to 4. Investigation of influenza by Dr. S. R. Hill.

Dryden, March 7. Investigation of influenza by Dr. S. R. Hill.

Royal Oak, March 7. Investigation of scarlet fever by Dr. S. R. Hill.

Potterville, March 10. Investigation of diphtheria by Dr. S. R. Hill.

Clare, March 11. Investigation of scarlet fever by Dr. S. R. Hill.

Evart, March 12. Investigation of influenza by Dr. S. R. Hill.

Rapid City, March 13. Investigation of scarlet fever by Dr. S. R. Hill.

Onsted, March 15. Investigation of encephalitis lethargic by Dr. S. R. Hill.

Ionia, March 17. Investigation of smallpox by Dr. S. R. Hill.

Constantine, March 21 and 22. Investigation of influenza by Dr. S. R. Hill.

Lansing, March 23. Investigation of smallpox by Dr. S. R. Hill.

Lansing, March 28. Investigation of smallpox by Dr. S. R. Hill.

Battle Creek, March 31, April 1. Investigation of diphtheria by Dr. S. R. Hill.

Birmingham, April 3 and 4. Investigation of encephalitis lethargic by Dr. S. R. Hill.

Williamston, April 2 and 5. Investigation of typhoid fever by Dr. S. R. Hill.

Concord, April 22. Investigation of scarlet fever by Dr. S. R. Hill.

Hopkins, April 24. Investigation of diphtheria by Dr. S. R. Hill.

Albion, April 25 and 26. Investigation of scarlet fever by Dr. S. R. Hill.

Hopkins, April 28 and 29. Investigation of diphtheria by Dr. S. R. Hill.

Dewitt, May 4. Investigation of smallpox by Dr. S. R. Hill.

Shaftsburg, May 4. Investigation of smallpox by Dr. S. R. Hill.

Bath, May 7. Investigation of smallpox by Dr. S. R. Hill.

Laingsburg, May 2 to 8. Investigation of smallpox by S. R. Hill.

Charlotte, May 12. Investigation of insanitary conditions by Dr. S. R. Hill.

Williamston, May 14. Investigation of typhoid fever by Dr. S. R. Hill.

Mendon, May 15. Investigation of scarlet fever by Dr. S. R. Hill.

Blanchard, May 17. Investigation of diphtheria by Dr. S. R. Hill.

Laingsburg, May 19. Investigation of smallpox by Dr. S. R. Hill.

Dewitt, May 19. Investigation of smallpox by Dr. S. R. Hill.

Marine City, May 20. Investigation of scarlet fever by Dr. S. R. Hill.

Rogers City, May 22 and 23. Investigation of encephalitis lethargic by Dr. S. R. Hill.

Dryden, May 25. Investigation of smallpox by Dr. S. R. Hill.

Pigeon, May 26. Investigation of insanitary conditions of hotel by Dr. S. R. Hill.

Adrian, May 30. Investigation of smallpox by Dr. S. R. Hill.

Mendon, May 31. Investigation of scarlet fever by Dr. S. R. Hill.

Potterville, June 2. Investigation of smallpox by Dr. S. R. Hill.

Owosso, June 4. Investigation of insanitary conditions by Dr. S. R. Hill.

Oxford, June 5. Investigation of insanitary conditions by Dr. S. R. Hill.

Milletts, June 6. Investigation of smallpox by Dr. S. R. Hill.

Owosso, June 7. Investigation of insanitary conditions by Dr. S. R. Hill.

Plainwell, June 9. Investigation of smallpox by Dr. S. R. Hill.

Laingsburg, June 11. Investigation of smallpox by Dr. S. R. Hill.

Denton, June 12. Investigation of smallpox by Dr. S. R. Hill.

Flushing, June 13. Investigation of scarlet fever by Dr. S. R. Hill.
Galien, June 15. Investigation of smallpox by Dr. S. R. Hill.
Redford, June 18. Investigation of scarlet fever by Dr. S. R. Hill.
Williamston, June 23. Investigation of typhoid fever by S. R. Hill.
Benton Harbor, June 25. Investigation of leprosy by Dr. S. R. Hill.
Palo, June 28. Investigation of smallpox by Dr. S. R. Hill.
Carson City, June 28. Investigation of scarlet fever by Dr. S. R. Hill.
Shepherd, June 30. Investigation of smallpox by Dr. S. R. Hill.

FINANCIAL REPORT

STATE BOARD OF HEALTH—ACT 255 P. A. 1913—FOR FISCAL YEAR ENDING JUNE 30, 1919.

1918.		
July 1.	Appropriation Act 255 P. A. 1913	$15,000 00
1919.		
May 1.	Credit by appropriation Act 187 P. A. 1919 to cover expenses for May and June, balance of fiscal year	3,543 20

Disbursements.

1.	Salaries of officers	$2,835 10		
2.	Expenses of members	403 15		
3.	Traveling expense	462 55		
4.	Instruments and books	59 46		
5.	Postage	1,350 00		
6.	Printing and binding	2,573 94		
7.	Paper, stationery, etc	3,998 62		
8.	Express, freight, cartage	255 02		
9.	Telephone and telegraph	411 56		
10.	Engraving	160 96		
11.	Office equipment	472 16		
12.	Educational purposes	185 65		
13.	Insurance	192 47		
14.	Miscellaneous	173 73		
	Total disbursements		$13,534 37	
	Unexpended balance		5,008 83	
			$18,543 20	$18,543 20

EXPENDITURES STATE BOARD OF HEALTH, LANSING LABORATORY, ACT 247 P. A. 1917, FOR FISCAL YEAR ENDING JUNE 30, 1919.

1918. July 1.	Appropriation Act 247 P. A. 1917			$7,500 00
1919. May 1.	Credit by appropriation Act 187, P. A. 1919, to cover expenses for May and June, balance of fiscal year			4,077 57
	Fees for chemical, bacteriological and toxicological examinations		$747 95	747 95

Disbursements.

1.	Salaries of officers	$4,457 23		
2.	Salaries of clerks	1,465 81		
3.	Laboratory supplies	3,064 88		
4.	Office equipment	23 60		
5.	Office supplies and stationery	227 45		
6.	Express, freight and cartage	59 41		
7.	Telephone and telegraph	66 57		
8.	Laboratory equipment	1,408 43		
9.	Printing and binding	245 43		
10.	Paper	228 15		
11.	Books	28 25		
	Total disbursements		$11,275 21	
	To Treasurer, unexpended balance, May 1, 1919		302 36	
			$12,325 52	$12,325 52

EXPENDITURES, STATE BOARD OF HEALTH—HOUGHTON LABORATORY–ACT 164, P. A. 1915, FISCAL YEAR ENDING JUNE 30, 1919.

1918. July 1.	Appropriation Act 164 P. A. 1915			$4,000 00
1919. May 1.	Credit by appropriation Act 187, P. A. 1919, to cover expenses for May and June, balance of fiscal year			973 88
	Fees for chemical, bacteriological and toxicological examinations		225 00	225 00

Disbursements.

1.	Salary of Bacteriologist	$2,471 77		
2.	Salaries of clerks	1,252 25		
3.	Laboratory supplies	524 93		
4.	Printing, stationery, etc.	131 76		
5.	Telephone	30 35		
	Total expenditures		$4,411 06	
	Unexpended balance to Treasurer May 1, 1919		562 82	
			$5,198 88	$5,198 88

EXPENDITURES BY STATE BOARD OF HEALTH—EMBALMERS FUND ACT 132 P. A. 1903, AS AMENDED BY ACT 151, P. A. 1907. FISCAL YEAR ENDING JUNE 30, 1919.

Fees received, Embalmers licenses, renewal licenses and reciprocal licenses, from July 1, 1918 to July 1, 1919			$832 00
Disbursements.			
1. Engraving, drawing, etc	$ 7 25		
2. Paper, stationery, etc	346 22		
3. Postage	300 00		
4. Printing and binding	127 58		
5. Expressage	3 00		
6. Telephone	35		
7. Miscellaneous	44 20		
Balance to Treasurer	3 40	832 00	
		$832 00	$832 00

BUREAU OF VENEREAL DISEASES.

Dr. R. M. Olin, Commissioner, Michigan Department of Health, Lansing, Michigan:

I herewith submit the report of the Bureau of Venereal Disease, Michigan Department of Health, for the year ending June 30, 1919, including the report of the Division of Social Service by Katharin Ostrander, Director of that Division, and of the Division of Education by Marjorie Delavan, Director of Education.

The report from July 1st to November 1st is made from records which were on file in the Bureau at the time I assumed the directorship, which was October 15, 1918.

Yours respectfully,
G. M. BYINGTON,
Director Bureau of Venereal Disease.

REPORT OF BUREAU OF VENEREAL DISEASE, MICHIGAN DEPARTMENT OF HEALTH, JULY 1, 1918—JUNE 30, 1919.

Personnel:

Dr. G. M. Byington, Director of Bureau of Venereal Disease; Mr. John P. Sanford, Special Investigator.

Miss Marjorie Delavan, Director of Educational Division; Miss Marion Spratt, Assistant.

Miss Katharin Ostrander, Director of Division of Social Service; Miss Elizabeth Jarrard, Assistant; Mrs. Beulah Brockway, Special Investigator.

Miss Frances Foster, Psychologist; Miss Ilsa Haupt, Secretary; Miss Katharine Roese, Investigator for Psychologist.

During the year there have been 6,340 cases of venereal disease reported to the Bureau of Venereal Disease, as follows:

Gonorrhea	4,003
Syphilis	2,269
Chancroid	68

1,121 of these cases have been hospitalized at the expense of the State as follows:

MALES.	
Gonorrhea	15
Syphilis	28
Gonorrhea and Syphilis	5
Chancroid	1
Total	49
FEMALES.	
Gonorrhea	754
Syphilis	261
Gonorrhea and Syphilis	46
Chancroid	11
Total	1,072
Grand total	1,121

HOSPITALS.

292 beds in seven hospitals have been available this year for the uniform treatment of venereal diseases. Patients that were hospitalized received both mental and physical examinations, treatments for any existing diseases besides their venereal infection, and in many cases surgical care.

CLINICS.

Eight clinics were co-operating with this department in diagnosing and treating venereal cases that did not need hospital care, and they were also providing after-treatment for discharged hospital cases. The average daily attendance at these clinics was 170. The clinics were following uniform methods of diagnosis and treatment, as were the hospitals in so far as it was possible.

From September, 1918, until the armistice was signed Provost Marshal General Crowder ordered all registrants suffering from venereal disease, at the time of their examination, to be reported to the Michigan Department of Health. Further, that every infected registrant be placed under treatment until ordered to camp. This work was successfully carried out in Michigan, and during this time a total of 278 men were reported to the Bureau of Venereal Disease, as follows:

Gonorrhea	200
Syphilis	72
Chancroid	6

209 were put under treatment.

1,440 doses of Arsphenamine have been distributed by this department to physicians for after-treatment of State patients discharged from the hospitals.

1919 legislation:

(Act No. 272, P. A. 1919.)

An Act to protect the public health; to prevent the spreading of venereal diseases, to prescribe the duties and powers of the State Department of Health and of local health officers and health boards with reference thereto, and to make an appropriation to carry out the provisions hereof.

(Act No. 25, P. A. 1919.)

An Act to prohibit the employment of persons affected with infectious or venereal disease in places where food or drink is manufactured, prepared, served or sold.

(Act 289, P. A. 1919.)

An Act to provide for the punishment of persons who share in the proceeds of prostitution, and for the competency of certain evidence of the trial thereof.

(Act No. 353, P. A. 1919.)

An Act to prohibit the employment of persons affected with infectious or venereal disease in places where cigars are manufactured.

REPORT OF DIVISION OF SOCIAL SERVICE, MICHIGAN DEPARTMENT OF HEALTH.

The Social Service Bureau has had 1,189 women under supervision during this year. These patients have been arranged for as follows:

Discharged from supervision	4
Died	16
Discharged for home quarantine	24
Deported	65
Left State	71
	180

Under supervision of Division, July 1, 1919:

Living as prostitutes	43
Incomplete reports	85
In institutions	100
Unable to locate July 1, 1919	168
Living at home	362
Working in restaurants	58
Working in factories	61
Working as clerks	22
In domestic service	97
Other occupations	13
	1,009
	1,189

List of agencies co-operating in supervision and apprehension of cases:

Police courts.
Local Boards of Health.
Visiting nurses.
Probate courts.
Red Cross.
U. S. employment service.
Charity organizations.
Y. W. C. A.
Travelers' Aid.
Children's Aid.
A. P. L.
W. C. T. U.
Council of National Defense.
Churches and local institutions.

Number visits and investigations by social workers from August, 1918, to July 1919:

To girls under care	3,262
To other persons about girls	3,712
Total	6,974
Average number of visits per month per worker	32
Average number of visits per case during year	6

SOCIAL WORK IN HOSPITALS.

Time spent in recreation has varied in different hospitals from ten to forty hours a week, supervised by local recreation workers.

Recreational activities:

- Corrective gymnastics.
- Moving pictures.
- Volley ball.
- Baseball.
- Croquet.
- Folk-dancing.
- Gardening.
- Dramatics.

Religious activities: Weekly services by Y. W. C. A. and Travelers' Aid, Catholic and Protestant ministers, mission workers.

Educational activities: Lectures on sex hygiene by resident and visiting physicians. Exercises in reading, spelling, arithmetic and memorizing quotations.

Occupational activities:

- General housework.
- Laundry work.
- Cooking.
- Surgical dressings.
- Sewing.
- Toy-making.
- Basketry.
- Crocheting.
- Tatting.

Burroughs Adding Machine Company workshop, maintained at Harper Hospital for use of patients, operated eight hours a day and accommodated 18 to 20 girls. Girls on payroll of the Burroughs company.

Report of Psychopathic Clinic.

Number of cases examined	758
Diagnosis feeble-minded needing institutional care	191
Feeble-minded and subnormal, recommended release under supervision	480
Insane or epileptic, institutional	25
Normal	57
Superior adult	3
No diagnosis	2
	758

The large percentage of feeble-minded needing institutional care, in a group of individuals who are a distinct menace to society, makes clear the need in this State for institutions for the care of such cases. The diagnosis resulting from these examinations and the recommendations of the psychologist are a distinct help to the field workers in re-establishing these patients in society and in placing them in employment.

It might be well to call attention to the fact that while the work of the Division of Social Service has increased almost five times, it has been unable to enlarge its equipment. The same staff of social workers is handling the 1,000 cases who handled the 250 cases in July, 1918. Some of the workers are handling as many as 75 cases. Detroit has 163, Battle Creek 51, Bay City 58, Flint 68, Grand Rapids 46, Jackson 26, Kalamazoo 25, Lansing 42 and Saginaw 45. Their work is purely co-operative; the department pays no part of their salaries.

I recommend that some steps be taken to give assistance to those workers in the field who are handling over twenty cases.

REPORT OF DIVISION OF EDUCATION, MICHIGAN DEPARTMENT OF HEALTH.

The work of the Division of Education has been carried on by means of lectures, slides, exhibits, pamphlets, books, posters and placards.

LECTURES.

Both full-time and part-time lecturers, physicians, men and women, constitute the lecturing staff. Ten sets of slides were used, five "Keeping Fit" and five general.

Number lectures given	764
Number localities reached by lectures (cities over 10,000 population,	27
localities under 10,000 population)	301
	328
Number persons reached by lectures—	
(Adults)	40,020
(Boys)	14,068
(Girls)	11,946
	66,034

Typical groups reached: Women's clubs of all sorts, Grange meetings, farmers' institutes; mass meetings, for men, for women and general factory talks, both men and women; high school, both boys and girls; church services; State conventions, nurses, pharmacists, etc.; nurses training schools; Y. M. C. A. and Y. W. C. A., medical societies, colleges and normals, business colleges, Jackson prison. State institutions: Industrial schools, school for the blind, etc. Department stores, laundries, Parent-Teachers' Associations, Rotary, Kiwanis and exchange clubs, W. C. T. U. "Keeping Fit" campaign: For high school boys in 27 counties, with co-operation of Y. M. C. A. in many counties.

EXHIBITS.

General exhibits—	
Framed	1
In metal screens	3
Unframed	3
"Keeping Fit" exhibits for boys—	
Framed	4
Unframed	2
	6

PAMPHLETS DISTRIBUTED.

"A," for young men	52,000
"B," for general public	38,000
"C," for boys	63,000
"D," for parents	43,000
"E," for girls	51,000
"F," for teachers	22,000
	342,000

In addition to quantity use, 3,806 individual requests for literature were received.

BOOKS.

A reading list was issued, and by arrangement with the publishers. orders were sent through the department.

POSTERS.

Large posters	1,000
Small posters	26,000
	27,000

PLACARDS.

1,600 placards framed and glassed, posted in stations, hotels, barber shops and public rooms.

CITY ORGANIZATION PLAN.

Under the City Organization Plan, 22 cities have been organized, having received benefit of intensive educational campaign and permanent organization of a local Social Hygiene Committee.

Two organizers worked under Division of Education. Plan applied to cities of 10,000 population and over.

Procedure: Organizer goes to city, introduced by letters from Division of Education; interviews key people and accomplishes two things: (1) arranges for lectures, and (2) organizes local social hygiene committee, made up of representative citizens. This furnishes permanent hold on community and medium for follow-up work.

BUREAU OF SANITARY ENGINEERING.

Dr. R. M. Olin, Commissioner, Michigan Department of Health, Lansing, Michigan.

Dear Doctor:—I hand you herewith my report for the year ending June 30, 1919.

MAJOR E. D. RICH,
State Sanitary Engineer.

ORGANIZATION OF THE OFFICE.

On August 2, 1918, Edward D. Rich, State Sanitary Engineer, was commissioned Major in the Sanitary Corps, U. S. A., and assigned to the directorship of the School of Sanitary Engineering, Camp Greenleaf, Chickamauga Park, Ga., on August 12.

Mr. F. Gardner Legg was made Acting State Sanitary Engineer when Major Rich left for army service, and resigned the position on October 1, 1918.

Mr. Otto E. Eckert succeeded Mr. Legg as Acting State Sanitary Engineer, until the return of Major Rich.

Mr. James R. Daugherty joined the force on December 2, 1918.

Major Edward D. Rich was discharged from the service on December 27, 1918, and resumed his duties as State Sanitary Engineer on January 1, 1919.

Lieut. John M. Hepler joined the force on February 19, 1919.

Lieut. Albert H. Jewell returned from service with the Engineers in France and resumed his former position in the department on March 20, 1919.

EXAMINATION OF PLANS FOR PUBLIC BUILDINGS.

Table No. 3 shows the list of plans for public buildings or additions thereto which have been recommended for approval.

CONFERENCES, CONSULTATIONS AND INSPECTIONS.

In Table No. 4 may be found a list, alphabetically arranged, of the visits made during the year for the purpose of assisting the municipalities or city officials in solving their problems of sanitation.

The problems deserving special mention are as follows:

1. Alma Water Supply: Since the failure to obtain a sufficient well water supply announced in the last report, additional efforts have resulted in the sinking of a number of wells about a hundred feet and the obtaining of a flowing supply. These are about to be connected to the new pumping station and it is now hoped that a sufficient quantity may be obtained. No information is as yet at hand relative to the reliability of these wells from the standpoint of purity.

2. Alpena Water Supply: Continued dissatisfaction with chlorination as a means of purifying the Alpena supply has resulted in a renewed discussion of the feasibility of filtration, but no definite steps have been taken.

3. Ann Arbor Water Supply: Construction has been completed for the furnishing of the Steere Farm water to Ann Arbor and it is about to be turned into the city mains. This will diminish the use of river water, and it is hoped that it will ultimately be possible to discontinue it entirely. Chlorination has been ordered for the well water taken from the district adjacent to the Washington Street pumping station.

4. *Bad Axe Sewerage and Sewage Disposal:* The sewer system has been completed and connected to the pumping station. The Imhoff tank, dosing chamber and sand filters have been completed, but as soon as water was turned into the dosing chamber, cracks developed on account of a treacherous foundation, which resulted in so much leakage that it could not be used. Repairs are under way. The sand used in the filters was not of the quality approved by this department and the authorities have been advised that it will not serve their purpose. No arrangements have as yet been made for its removal. The pump which is intended to lift the sewage which comes to the pumping station into the Imhoff tank is only about one-fifth large enough. The authorities have been informed of our findings in this regard and advised to take immediate steps for the installation of a proper pump, in order to prevent the escape of raw sewage into the drainage ditch, which forms the final outlet for Bad Axe.

5. *Bay City Water:* There seems to be a renewal of interest in filtration for the Bay City water supply, and while no definite steps have been taken, it is hoped, now that the war is over, that better results may be anticipated.

6. *Birmingham Water Supply:* Owing to the rapid growth of this municipality it is feared that the present water supply will soon prove inadequate. A committee has been appointed to investigate sources of supply and we have advised that a study of the possibility of a surface water supply supplemented by filtration be made.

7. *Buchanan Sewerage:* There is a renewed interest in the construction of sewers at Buchanan, partly for the purpose of protecting the purity of the water supply. The chief obstacle now seems to be the obtaining of a right of way for the outfall sewer and treatment works. We have advised that, should no agreement with the owners be possible, condemnation proceedings be started at once.

8. *Cadillac Water Supply:* Chlorination of this supply has not resulted in the furnishing of a safe drinking water at all times, though sincere efforts to obtain such a supply have been made by the water company. The difficulty is probably due to the high organic content of the lake from which the supply is taken. We are endeavoring to assist them in their difficult problems.

9. *Comstock Park, Tannery Waste Disposal:* Experiments with the activated sludge waste disposal have been continued, but no definite results can be given at present.

10. *Dearborn Sewerage and Sewage Disposal:* The construction of a sewer system and sewage disposal works is well under way. The rapid growth of this village during the past year has made a number of extensions to the original design for sewers necessary. A storm water sewer system is also being designed.

11. *Detroit Water:* The operation of the experimental filter plant mentioned in the last report has demonstrated that, in designing a filter plant for the city, the sizes of certain parts can be reduced from what would be determined upon according to standard practice, so as to save a large amount of money. No financial arrangements have been made

for the construction of the entire plant, but sufficient funds have been included in this year's budget to build the low-lift pumping station which will assist in delivering a larger quantity of water to the high service pumps until the filter plant is constructed.

12. Escanaba Water Supply: The city of Escanaba has purchased the interests of the North Michigan Water Company and is making arrangements to raise sufficient funds to carry out the orders of the Michigan Department of Health with reference to the Ludington Street sewer.

13. *Flint Water Purification*: Improvements at the filter plant, which will double its capacity and provide for water softening, have been completed and put into operation.

14. Flint Sewerage: Objections have again been raised by the village of Flushing against the continued pollution of the Flint River by the discharge into it of the untreated sewage of Flint. The Flint officials have informed the authorities at Flushing that they will take up this important question at the earliest opportunity, but on account of the rapid growth of the city and consequent necessity for extensive extension of the sewer system, no improvement is likely in less than two or three years.

15. *Ford Water Supply:* We have advised this village to endeavor to make arrangements whereby water may be obtained from the new filter plant at Wyandotte as soon as it is completed.

16. Fremont Sewage Disposal: An experiment plant for the treatment of combined wastes from the city sewage, Michigan Tanning & Extract Co. and the canning factory of the Fremont Canning Co., has recently been constructed for the purpose of determining if it is feasible to handle these wastes in one plant and, if so, what method of treatment will be best adapted to this condition. The testing station includes sedimentation tank, contact filters, trickling filter, lath filter and activated sludge. An engineer is employed by the three interested parties to supervise the experiments. It is hoped that sufficient information can be obtained to enable legal steps, for the construction of a combined plant, to be taken during the fall of 1919.

17. Grand Rapids Sewage Disposal: An experimental plant under the direction of consulting engineers has been constructed for the purpose of determining the information necessary to design the details of a treatment plant for the entire city flow. This plant consists of a Dortmund tank with separate deep sludge digestion tanks.

18. Grosse Pointe Sewage Disposal: The sewage disposal plant at Grosse Pointe has been completed and put into operation, but sufficient time for determining the results obtained has not yet elapsed. The plant consists of a pumping station, Imhoff tank, contact filters and sand filters.

19. Harbor Beach Sewage Disposal: This plant has been completed and put into operation and is giving satisfactory results. It consists of Imhoff tank and sand filters.

20. Harbor Beach Water Supply: A few more cases of typhoid fever have appeared and as a result the city officials have authorized the installation of liquid chlorine sterilization with laboratory control.

21. Highland Park Water Supply: Satisfactory progress is being made on the construction of the filter plant and it is hoped it will be ready for service about the end of 1919.

22. Howell, State Tuberculosis Sanatorium Sewage Disposal: At the request of the Superintendent of this institution we have make measurements for the purpose of designing improvements and extensions, and changing the system employed so as to produce better results. It is proposed to increase the size of the sedimentation tank and construct sprinkling filters in place of those now in use.

23. Ironwood Water Supply: The experimental plant mentioned in the last report is in operation, but the final conclusions are not yet available.

24. Ithaca Sewage Disposal: The Ithaca sewage disposal plant has been found to be in a disgraceful state of neglect. Pre-emptory orders were issued to the authorities to clean the entire plant and operate it with regularity. These instructions have been productive of good results.

25. Jackson Water Supply: Several new wells with a low-lift electrical pumping station have been constructed in the southeast part of the city to augment the supply taken from the old wells. An inspection of the surroundings of these wells disclosed the fact that they would be very liable to contamination on account of the height of the ground water above the tops of the wells and the proximity of the same to the municipal piggery and nightsoil dump. Chlorination was, therefore, advised. A liquid chlorine machine was installed at the main station and so arranged as to treat the entire amount of water supplied to the city, whether from the old wells or the new.

26. Kalamazoo State Hospital Water Supply: At the recent session of the Legislature funds were not provided for testing the possibility of obtaining additional ground water supply, and for this reason it was found necessary to fall back upon chlorination of the present supply.

27. Lansing Water: During March, 1919, a very severe epidemic of dysentery appeared in the southwest part of the city, particularly among the employees of the Olds Motor Works, which rapidly spread over the entire territory supplied by the Lansing water system. This was followed by about 65 cases of typhoid fever, with nine deaths. A thorough investigation of the purity of the water supply was immediately made after the onset of the dysentery epidemic. It was found that the connection between the suction main and the Townsend Street wells was not absolutely tight and that a large city sewer was situated parallel to the suction line and only a short distance from the wells, being only about ten feet in some cases. During the period of high water this sewer undoubtedly was under hydraulic pressure, which would tend to force the sewage through the joints and into the ground immediately surrounding the wells. Inasmuch as the sewer was higher than the tops of the wells and the joints between the suction pipes and the well casings were not absolutely tight, it seems certain that these leaks were the openings through which contamination reached the water supply from the sewer. The Townsend Street station was immediately shut off from the distribution system and continued tests showed the output to be unsafe at all times. Individual samplers were installed on each well and it was found that some were safe most of the time, others unsafe nearly all of the time, and still others fluctuating between safe and unsafe. Clorination was installed at the Central Station and Pennsylvania Ave. Station immediately by means of the emergency machines of the State Board of Health. All of the stations have now been equipped with liquid chlorine machines owned by the city except Seymour Street, which has shown constantly safe results from the beginning. The wells at the Townsend Street Station were repaired as soon as possible under the direct supervision of a representative of this office, but the station was not again put into commission until it became necessary to do so to prevent a threatened shortage of water, and then only after it was demonstrated that chlorination of its output produced safe results.

This exceedingly regrettable epidemic has again demonstrated the futility of blind reliance upon a well water supply for continued purity without frequent tests. It was supposed that these wells, which are upwards of 300 feet deep, were absolutely pollution-proof, but careful investigation demonstrated how dangerous it is to rely upon such statements which in reality are founded on but little more solid foundation than that of rumor.

28. *Lapeer, Michigan Home and Training School Sewerage:* Two new cottages about to be constructed are not tributary to the present sewer system. It was proposed to construct another disposal plant, but upon investigation it was recommended that a small pumping station be built to elevate the flow from these cottages into the present Imhoff tank.

29. *Lake Odessa Creamery Waste Nuisance:* Suit has been brought against the proprietors of the milk condensery to restrain them from further pollution of a small ditch which empties into the lake about a quarter of a mile from the factory, but the case has not yet come to trial.

30. *Marine City Water Supply:* An automatic chlorinating apparatus has been installed and laboratory control was arranged for during the past winter. One of the teachers in the high school did the work without compensation and, upon the close of school in June, laboratory control was discontinued because of the unwillingness of the authorities to expend any money for this purpose. We are contemplating legal action to compel better attention to this polluted water supply.

31. *Midland Water Supply:* An experimental filter under the direction of consulting engineers has been constructed and operated intermittently. Definite results of these experiments are not yet available.

32. *Monroe Water:* Additional efforts have been made between representatives of the city and the Monroe Water Company to enable them to construct a filter plant. The latest developments in this problem contemplate the placing of the filter near the center of the city with low-lift pumping station at the present site near the lake. Prospects now seem brighter for an early settlement of this vexing question.

33. *Muskegon Water Supply:* Tests of the water being furnished to consumers at Muskegon through the municipal water supply cast grave doubts upon its purity. The location of the intake is such that it is undoubtedly polluted with city sewage. Chlorination has been recommended, but the officials do not seem to show much interest in the matter.

34. *Muskegon Heights Sewage Disposal:* This plant has been completed and put into operation and is provided with a competent operator. Good results may be expected from so complete a plant.

35. *Niles Sewerage:* On account of some changes in the policy of the Michigan Central Railroad, Niles anticipates a very rapid growth in population. This has necessitated the extension of the sewer system. We recommended that careful consideration be given to the question of

separating domestic sewage from storm flow in the new work, but the engineer who designed the system did not follow our advice.

36. North Port Pointe Water Supply: This is a summer resort situated on the west shore of the Grand Traverse Bay near the village of Northport. A private water company has furnished water for domestic consumption for the inhabitants of this resort. This supply was taken from shallow wells which became polluted from defective plumbing in the hotel. The Resort Owners' Association attempted to buy the equipment with the idea of seeking a new supply, but arrangements could not be made with the owner. The Association, therefore, built its own water system, which is supplied from a well on the lake shore. Several samples have been analyzed and the quality of the water found to be fairly good, but not entirely above suspicion. The ground surrounding the original wells was thoroughly sterilized with hypochlorite, and a series of tests taken subsequently showed that pollution had not been entirely eliminated. Chlorination of this supply is being maintained.

37. Otsego Water Supply: During the past winter the village officials of Otsego were ordered by the Michigan Department of Health to cease supplying consumers with polluted water. The wells constructed some years ago did not furnish a sufficient quantity and polluted Kalamazoo River water has been used. An attempt to rely upon well water to the exclusion of river water was unsuccessful. Efforts were then immediately put forward to construct additional wells and we have not insisted upon the order for immediate discontinuance of the river supply, because we believe that satisfactory progress is being made in the construction of new wells.

38. Petoskey Water Supply: Continued tests of the Petoskey supply indicated that the wells in use could not be relied upon with safety and chlorination of the supply has been installed.

39. Plymouth Water Supply: It was discovered that the water supply of Plymouth showed signs of pollution. An inspection of the springs from which the water is derived showed that the pollution was all coming from one spring, which is situated at a comparatively short distance from a farm house, which probably is the source of the trouble. This spring has been disconnected from the system.

40. Pontiac Sewage Disposal: By a vote of the people a bond issue was authorized for the construction of sewage disposal works and an outfall sewer. The contract has recently been let for this work.

41. Saginaw Water Supply: The question of a pure water supply for the city of Saginaw is again being agitated. A citizens' committee of about 70 with an executive committee of 11 has again been appointed to investigate all possible sources of supply. It is hoped that this repetition of investigation will be rapidly concluded so that the matter may be speedily settled.

42. Sandusky Sewage Disposal: Complaints have been registered with this department about the foul condition of the county ditch which receives all the flow from the combined sewer system of Sandusky. The matter has been brought to the attention of the officials and the necessity for immediate action emphasized, but nothing definite has yet been done.

43. St. Louis Water Supply: St. Louis has at last decided to abandon the use of polluted Pine River water and arrangements have been made for putting down a number of deep wells immediately around the pumping station. One 8-inch well has already been completed and a satisfactory flow obtained. As this is in the immediate vicinity of the so-called St. Louis mineral spring, which is in reality a deep well, it is hoped that a supply of pure and wholesome water may be obtained.

44. Williamston Typhoid Fever Epidemic: During the past winter the occurrence of a number of cases of typhoid fever came to our attention. A study of this epidemic seems to indicate that it was milk-borne and due to a carrier who was employed at the dairy supplying the village. The appearance of subsequent cases after the carrier had left the farm contradicted this theory and a later investigation developed the fact that the village is in a quite insanitary condition with reference to privies and outhouses being situated fairly close to the private wells from which the inhabitants obtain water. An ordinance has been passed requiring sanitary privies. This seems to have created some sentiment in favor of a sewer system and it is hoped this will be the result.

45. *Wyandotte Water Supply:* During the summer of 1918 pressure was brought to bear upon the officials of Wyandotte through the U. S. Shipping Board to induce them to provide a pure water supply for the workers at the shipyard situated at Wyandotte. This, together with threats from this department, resulted in the agreement by the City Commission to submit the question to a vote of the people. The result of this election was highly gratifying, the proposition being carried by a handsome majority. Contracts have been let and a filtration plant is under construction. It was expected to have it completed early in the fall of 1919, but difficulties in obtaining labor will probably delay the realization of this hope for a few months. In the meantime the exceedingly dangerous Detroit River water is being furnished to the inhabitants after being chlorinated without satisfactory results.

TABLE NO. 1.—*Municipalities which have sewage disposal works in operation so far as is known at the present time.*

Name of Municipality.	Character of Sewage.	Estimated Percent Population served.	Process.	Final Outlet.	Efficiency.	Remarks.
Almont	House flow	20	Septic tank	Clinton River	....	
Bad Axe	House flow, separate	....	Pumps, Imhoff tank and sand filters	County ditch	....	Considerable infiltration.
Baltic	House flow, separate	....	Three cesspools used as settling tank	Small creek into Pilgrim River	....	
Birmingham	House flow, separate	....	Imhoff tank	River Rouge	....	
Cadillac	House flow, separate	50	Septic tank, stone beds	Clam River	Poor	Poor design.
Caro	House flow, separate	80	Septic tank, sand filters	Cass River	Excellent	Filters of natural earth, beds dosed intermittently..............
Charlevoix	House flow	....	Two septic tanks	Pine River and Round Lake	....	
Coldwater	House flow	75	Two septic tanks	Coldwater Creek	Good	Considerable infiltration.
Dearborn	House flow, separate	....	Imhoff tank	River Rouge	....	Under construction.
Durand	Combined	50	Four settling tanks and cinder filters	Three mile creek	Poor	Bad design.
E. Grand Rapids	House flow, separate	70	Imhoff tank and sand filters	Silver Creek	Excellent	Careful operation.
East Lansing	House flow, separate	Few houses.	Septic tank	Ditch	....	
Escanaba	House flow, separate	....	Activated sludge	Little Bay de Noc	....	Not yet in use.
Fremont	House flow separate	40	Septic tank	Darling Creek	Fair	Tank too small, given poor attention.
Grosse Pointe	House flow, separate	90	Pumping station, Imhoff tank, contact beds, sand filters	....	....	

Harbor Beach	House flow, separate	80	Imhoff tank and sand filters	Lake Huron	Excellent.	Careful operation.
Harbor Springs	House flow, separate	50	Coarse screens	Little Traverse Bay		
Hastings	House flow, separate	Several blocks	Imhoff tank	Thornapple River	Good	
Imlay City	House flow, separate		Septic tank	Belle River		
Ironwood			Imhoff tank and rock filters	Montreal River		
Ithaca	House flow, separate	60	Septic tank and sand filters	Ditch	Poor	Hand dosing neglected.
Jackson	Combined		Septic tank and contact filters	Grand River	Poor	Not operating continuously.
Lawrence	House flow, separate	Small	Septic tank	Paw Paw River		
Muskegon Heights	House flow, separate		Imhoff tank, contact and sand filters	Little Black Creek		Recently completed.
North Branch	Combined		Septic tank	County drain to Flint River		
Petoskey	House flow, separate	Few houses.	Septic tank	Little Traverse Bay	Good	
Red Jacket	House flow, separate	50	Waste land	Into ground	Good	Fair operation.
Reed City	House flow, separate	40	Shallow two story tank.	Horsey River	Good	Considerable infiltration.
St. Johns	House flow, separate	85	Natural earth filtration.	Open ditch	Excellent.	Operation fair, much roof water.
Sturgis	House flow separate	50	Septic tank and stone beds	Open ditch	Poor	Bad design, operation good.
Zeeland	House flow, separate	60	Septic tank and sand filter	Open ditch	Excellent	Excellent operation.

INSTITUTIONS IN THE STATE

City.	Institutions.	Kind of Sewage Disposal.
Ann Arbor	University of Michigan—Experimental station	All processes.
Battle Creek	Camp Custer	Two Doten tanks.
Bay View	Assembly Camp Grounds	Septic tank.
Berlin	Interurban Station	
Buchanan	Celfor Tool Company	Septic tank.
Beulah	Benzonia Academy	Septic tank and sub-surface irrigation.
Central Lake	Public School	Septic tank.
Clio	Public School	
Cutlerville	Psychopathic Hospital	Imhoff tank and sand beds.
Eloise	Wayne County Home	Imhoff tank and contact beds.
Epworth Heights	Summer Resort	Septic tank.
Ford Republic	Boys' Home	Imhoff tank and sand filters.
Frankfort	Congregational Assembly Grounds	
Fruitport	G. R., G. H. & M. Railroad Shops	
Grandville	Public School	Septic tank and sub-surface irrigation.
Hillsdale	County Infirmary	Imhoff tank and sand filters.
Howell	Tuberculosis Sanatorium	Septic tank, gravel and cinder filters.
Houghton	Tuberculosis Sanatorium	
Kent County	Kent County Infirmary	Imhoff tank.
Lapeer	Michigan Home and Training School	Imhoff tank.
Muskegon Heights	The C. G. Fleckenstein Tannery	Imhoff tank and sand filters.
Mt. Clemens	Selfridge Aviation Field	Septic tank, contact beds, sterilization.
Oakland County	Venice-on-the-Lakes	Imhoff tank.
Ontonagon	Poor Farm	Septic tank and sand filters.
Topinabee	Camp Davis (Engineers' Camp)	Septic tank.
Wahjamega	Michigan Farm Colony for Epileptics	Septic tank.
Wayland	Public School	Septic tank and sub-surface irrigation.
		Total 27

TABLE No. 2—*Municipalities using hypochlorite, liquid chlorine or Ultra Violet Ray for treatment of their Public Water Supply, to July 1, 1919.*

LIQUID CHLORINE.

Adrain*
Alpena
Ann Arbor
Battle Creek
Bay City
Cadillac
Detroit
East Grand Rapids
Flint*
Grand Rapids*
Highland Park
Hillsdale
Ironwood
Grosse Pointe Farms
Manistique
Marine City
Marquette
Menominee*
Monroe
Mt. Clemens (Selfridge Field),.
Munising
Negaunee
Niles
Petoskey
Port Huron
Sault Ste. Marie
St. Clair
St. Joseph
Stambaugh
Traverse City
Trenton
Total 31

HYPOCHLORITE.

Dearborn*
Escanaba*
Gladstone.
Ludington.
Norway**
Sibley (Solvay Process Co.)
South Haven.
Wyandotte.
Total 8

ULTRA VIOLET RAY

Wyandotte (Detroit Shipbuilding Co.)
Total 1

*Adjunct to filtration.
**Treat water only part of the time.

TABLE No. 3—*Showing plans and specifications for State Buildings recommended for approval by the State Sanitary engineer, from June 30, 1918 to July 1, 1919.*

July	11	Newaygo County Infirmary, Fremont*.
July	27	Michigan Farm Colony for Epileptics, Cottage No. 7 for men, Wahjamega.
Sept.	16	Benzie County Alms House.

*Approved conditionally.

TABLE NO. 4.—*Sanitary Inspections and Consultations from July 1, 1918 to July 1, 1919.*

Location.	Date.	Subject.	Engineer.
Adrian	July 25, 1918	Water supply	W. C. Hirn.
Adrian	June 27, 1919	Sewerage—State Institution for Girls	A. H. Jewell.
Allegan	July 31, 1918	Typhoid Investigation	F. Gardner Legg
Alma	June 18, 1919	Water supply	E. D. Rich.
Alma	June 18, 1919	Water supply	A. H. Jewell.
Alpena	Jan. 15–16, 1919.	Water chlorination	W. C. Hirn.
Alpena	April 8, 1919	Water purification	W. C. Hirn.
Ann Arbor	Oct. 4, 1918	Interview with Prof. Decker regarding Eloise Sewage disposal	W. C. Hirn.
Ann Arbor	Feb. 4, 5, 1919	Consultation with Hoad and Decker regarding Royal Oak and Highland Park water	J. M. Hepler.
Ann Arbor	Feb. 8, 1919	Conference with Col. Hoad regarding Monroe water	O. E. Eckert.
Ann Arbor	Feb. 27, 1919	Michigan Engineering Society	E. D. Rich.
Ann Arbor	Feb. 28, 1919	Inspection of Sewage Experimental Station at U. of M. Sewer and water extension plans	J. R. Daugherty.
Ann Arbor	Feb. 28, 1919	Conference with Col. Hoad on Monroe water	E. D. Rich.
Ann Arbor	Feb. 28, 1919	Conference with Col. Hoad on Monroe water	O. E. Eckert.
Ann Arbor	May 16, 1919	Filing of plans	E. D. Rich.
Ann Arbor	May 16, 1919	Conference on Monroe water	E. D. Rich.
Ann Arbor	May 16, 1919	Water purification	E. D. Rich.
Armada	Aug. 23, 1919	Stream pollution	O. E. Eckert.
Atlanta	Oct. 8, 9, 10, 1919	Typhoid investigation	W. C. Hirn.
Bad Axe	July 2, 1918	Sewage disposal	O. E. Eckert.
Bad Axe	July 4, 1918	Sewage disposal	O. E. Eckert.
Bad Axe	Aug. 8, 1918	Sewage disposal	O. E. Eckert.
Bad Axe	Sept. 4, 1918	Conference at Saginaw with R. W. Roberts regarding sewage disposal	O. E. Eckert.
Bad Axe	Nov. 11, 1918	Sewage disposal	O. E. Eckert.
Bad Axe	June 3, 4, 1919	Sewage disposal	E. D. Rich.
Baraga	Sept. 26, 1918	Filing of plans	O. E. Eckert.
Battle Creek	Aug. 31, 1918	Sewage disposal for Addition to Camp Custer	W. C. Hirn.
Battle Creek (Camp Custer)	Feb. 10, 1919	Sewerage and garbage disposal	E. D. Rich.
Battle Creek	Mar. 22, 1919	Water purity	W. C. Hirn.
Bay City	July 25, 1918	Industrial plant sanitation	O. E. Eckert.
Bay City	Aug. 9, 1918	Filing of plans	O. E. Eckert.
Bay City	Jan. 14, 1919	Interview with R. C. Dawson on water laboratory inspection	W. C. Hirn.
Bay City	April 7, 1919	Water purification	W. C. Hirn.
Bay City	May 13, 1919	Water purification	W. C. Hirn.
Bellevue	May 29, 1919	Sewerage	J. M. Hepler.
Benton Harbor	May 31, 1919	Water and sewerage	J. M. Hepler.
Berrien Springs	June 2, 1919	Water	J. M. Hepler.
Bessemer	Sept. 22, 1918	Water supply purity	O. E. Eckert.
Bessemer	Jan. 18, 1919	Water supply purity	O. E. Eckert.
Bessemer	May 13, 1919	Water supply purity.—Location and construction	O. E. Eckert.
Birmingham	July 30, 1918	Sewage disposal	W. C. Hirn.
Birmingham	Nov. 22, 1918	Water	W. C. Hirn.
Birmingham	Dec. 26, 1918	Water	O. E. Eckert.
Birmingham	April 22, 1919	Water and sewerage	J. M. Hepler.
Bridgman	Feb. 7, 1919	Sewerage	W. C. Hirn.
Bronson	May 9, 1919	Inspection of flooded condition caused by lack of sewers	J. M. Hepler.
Buchanan	July 5, 1918	Nuisance in stream. Purity of municipal supply—Sewerage and sewage disposal	F. Gardner Legg.
Buchanan	April 24, 1919	Sewerage—Water supply purity	O. E. Eckert.
Buchanan	June 20, 1919	Sewers	E. D. Rich.
Byron	May 5, 1919	Water and sewerage	J. M. Hepler.
Cadillac	Jan. 31, 1919	Water chlorination	W. C. Hirn.
Cadillac	Mar. 27, 1919	Laboratory inspection	W. C. Hirn.
Cadillac	Mar. 28, 1919	Laboratory inspection	W. C. Hirn.
Cadillac	May 7, 1919	Water purification	W. C. Hirn.
Calumet and Red Jacket	Sept. 24, 1918	Sewage disposal	O. E. Eckert.

TABLE NO. 4.—*Sanitary Inspections.—Continued.*

Location.	Date	Subject.	Engineer.
Capac	May 7, 1919	Water and sewerage	J. M. Hepler.
Casnovia	Aug. 8, 1918	Industrial waste—Disposal	W. C. Hirn.
Casnovia	June 4, 1919	Sewerage	J. M. Hepler.
Cassopolis	Mar. 5, 1919	Water supply purity	O. E. Eckert.
Cedar Point	July 27, 1918	Summer resort sanitation	F. Gardner Legg.
Cheboygan	Jan. 17, 1919	Water and sewerage—Filing of plans	W. C. Hirn.
Cheboygan	May 14, 1919	Filing of plans	W. C. Hirn.
Chesaning	May 9, 1919	Water and sewerage	J. M. Hepler.
Chicago	Dec. 9–12, 1919	A. P. H. A. Meeting	O. E. Eckert.
Chicago	Feb. 11, 1919	Conference on North Port Point water	O. E. Eckert.
Cincinnati	April 3, 1919	North Port Point water	O. E. Eckert.
Clarkston	May 2, 1919	Water and sewerage	J. M. Hepler.
Clifford	June 4, 1919	Creamery waste nuisance	E. D. Rich.
Clio	July 25, 1918	Sewerage	O. E. Eckert.
Clio	June 11, 1919	Nuisance	W. C. Hirn.
Coldwater	July 29, 1918	Inspection of sewage disposal works	F. Gardner Legg.
Coloma	Aug. 16, 1918	Water supply purity and sewerage	O. E. Eckert.
Comstock Park	Oct. 17, 1918	Tannerywaste disposal	W. C. Hirn..
Comstock Park	Oct. 24, 1918	Tannery waste disposal	W. C. Hirn.
Comstock Park	Nov. 13, 1918	Tannery waste disposal	W. C. Hirn.
Comstock Park	Nov. 23, 1918	Tannery waste disposal	W. C. Hirn.
Comstock Park	Dec. 30, 1918	Tannery waste disposal	W. C. Hirn.
Comstock Park	Feb. 20, 1919	Tannery waste disposal	W. C. Hirn.
Comstock Park	March 17, 1919	Tannery waste disposal	W. C. Hirn.
Comstock Park	April 4, 1919	Tannery waste disposal	W. C. Hirn.
Comstock Park	April 12, 1919	Tannery waste disposal	W. C. Hirn.
Coopersville	Aug. 17, 1918	Stream Pollution	O. E. Eckert.
Croswell	May 27, 1919	Conference with Mayor regarding water supply	W. C. Hirn.
Crystal Falls	May 10, 1919	Water supply purity	O. E. Eckert.
Cutlerville	Oct. 25, 1918	Sewage disposal	W. C. Hirn.
Dearborn	Mar. 7, 1919	Water and sewerage	J. M. Hepler.
Dearborn	Apr. 3, 1919	Water	J. M. Hepler.
Dearborn	Apr. 5, 1919	Water	J. M. Hepler.
Deckerville	July 2, 1918	Trade waste disposal	O. E. Eckert.
Delhi Twp. (Ingham Co.)	Aug. 13, 1918	Sewage disposal nuisance	F. Gardner Legg.
Detroit	July 18, 1918	Wyandotte water	E. D. Rich.
Detroit	July 22, 1918	Wyandotte water	E. D. Rich.
Detroit	July 25, 1918	Wyandotte water	E. D. Rich.
Detroit	July 30, 1918	Hearing on Wyandotte water before State Board of Health	F. Gardner Legg.
Detroit	July 30, 1918	Wyandotte water hearing	O. E. Eckert.
Detroit	July 30, 31, 1918	Hearing on Wyandotte water before State Board of Health	E. D. Rich.
Detroit	Sept. 5, 1918	Nuisance at Chemical Works	F. Gardner Legg.
Detroit	Sept. 21, 1918	Conference regarding fumes from Detroit Chemical Works	W. C. Hirn.
Detroit	Dec. 19, 1918	Wyandotte water	O. E. Eckert.
Detroit	Feb. 22, 1919	Sewage disposal for subdivision at Detroit	W. C. Hirn..
Detroit	Mar. 3, 1919	Consultation on Birmingham sewer plans	J. R. Daugherty.
Detroit	Mar. 17, 1919	Conference with Col. Hoad on Monroe water and filing of plans	O. E. Eckert.
Detroit	Mar. 28, 1919	Conference with C. W. Hubbell on Detroit, Dearborn and Pontiac sewers	E. D. Rich.
Detroit	April 25, 1919	Conference with C. W. Hubbell on Pontiac sewage disposal	E. D. Rich.
Detroit	April 25, 1919	Conference Albert Kahn on sewage disposal of factory	E. D. Rich.
Detroit	April 25, 1919	Dearborn sewerage	E. D. Rich.
Detroit	April 26, 1919	Conference with City Board of Health on sewage disposal of Detroit	E. D. Rich.
Detroit	June 13, 1919	Nuisance	W. C. Hirn.
Dowagiac	Feb. 14, 1919	Consultation on advised change in sewer design	J. R. Daugherty.
Dowagiac	April 24, 1919	Sewerage	O. E. Eckert.

TABLE NO. 4.—*Sanitary Inspections.—Continued.*

Location.	Date.	Subject.	Engineer.
Dundee	Dec. 3, 1918	Water	W. C. Hirn..
Eaton Rapids	July 10, 1918	Purity of water supply	O. E. Eckert.
Eaton Rapids	Aug. 13, 1918	Purity of water supply	F. Gardner Legg.
Eaton Rapids	June 30, 1919	Sanitary inspection	J. M. Hepler.
Ecorse	April 4, 1919	Sewerage	J. M. Hepler.
Eloise	Dec. 6, 1918	Sewage disposal	W. C. Hirn.
Eloise	Mar. 6, 1919	Wayne County Home sewage disposal	J. M. Hepler.
Escanaba	Sept. 18, 1918	Sewage disposal	O. E. Eckert.
Escanaba	Jan. 13, 1919	Water supply purity and sewerage	O. E. Eckert.
Escanaba	May 17, 1919	Water purification	W. C. Hirn.
Farmington	May 14, 1919	Inspection of car barn and polluted stream	J. R. Daugherty
Fenton	Aug. 22, 1918	Sewerage	O. E. Eckert.
Fenton	April 4, 1919	Sewerage	J. M. Hepler.
Fenton	May 1, 1919	Water and sewerage	J. M. Hepler.
Ferndale	May 8, 1919	Meeting regarding sewers and water	J. R. Daugherty.
Flat Rock	Aug. 24, 1918	Stream Pollution	W. C. Hirn.
Flint	July 17, 1918	Housing	E. D. Rich.
Flint	Nov. 20, 1918	Housing	O. E. Eckert.
Flint	Jan. 21-23, 1919	Water supply purity	O. E. Eckert.
Flint	Jan. 22, 1919	Inspection of Filter Plant	J. R. Daugherty.
Flint	Jan. 22, 1919	Water purity	W. C. Hirn.
Flint	Jan. 22,23, 1919	Michigan Engineering Society	E. D. Rich.
Flint	May 6, 1919	Water purity	W. C. Hirn.
Ford	July 30, 1918	Water supply purity	O. E. Eckert.
Ford	April 4, 1919	Water and sewerage	J. M. Hepler.
Ford	April 9, 1919	Water and Sewerage	J. M. Hepler.
Freesoil	June 5, 1919	Water and sewerage	J. M. Hepler.
Fremont	Aug. 7, 1918	Sewerage and Industrial Waste disposal	W. C. Hirn.
Fremont	Nov. 14, 1918	Conference on nuisance from industrial waste and sewage	W. C. Hirn.
Fremont	Mar. 19, 1919	Industrial waste disposal	W. C. Hirn.
Fremont	April 11, 1919	Sewage disposal and trade waste disposal	W. C. Hirn.
Fremont	May 6, 1919	Sewage disposal and trade waste disposal	W. C. Hirn.
Fremont	June 10, 1919	Water purification	W. C. Hirn.
Fremont	June 24, 1919	Sewage disposal	W. C. Hirn.
Gladstone	Sept. 17, 1918	Chlorination inspection	O. E. Eckert.
Gladstone	Jan. 14, 1919	Water supply purity	O. E. Eckert.
Gladstone	May 17, 1919	Water purification	W. C. Hirn.
Grand Rapids	July 3, 4, 1918	Tannery waste disposal	W. C. Hirn.
Grand Rapids	July 12, 1918	Tannery waste disposal	W. C. Hirn.
Grand Rapids	July 13, 1918	Conference with Jas. R. Rumsey on sewage disposal at Fremont	W. C. Hirn.
Grand Rapids	Aug. 1, 1918	Sewerage and sewage disposal—Conference with city engineer regarding sewage testing station	F. Gardner Legg.
Grand Rapids	Aug. 6, 1918	Tannery waste disposal	W. C. Hirn.
Grand Rapids	Aug. 12, 1918	Tannery waste disposal	W. C. Hirn.
Grand Rapids	Aug. 28, 1918	Tannery waste disposal	W. C. Hirn.
Grand Rapids	Sept. 5, 1918	Tannery waste disposal	W. C. Hirn.
Grand Rapids	Sept. 10, 1918	Tannery waste disposal	W. C. Hirn.
Grand Rapids	Sept. 26, 1918	Tannery waste disposal	W. C. Hirn.
Grand Rapids	Sept. 27, 1918	Conference with E. H. Christ regarding sewage disposal works at Cutlerville	W. C. Hirn.
Grand Rapids	Oct. 31, 1918	Survey of Grand River	W. C. Hirn.
Grand Rapids	Nov. 1, 1918	Water filtration plant	W. C. Hirn.
Grand Rapids	Dec. 30, 1918	Water	W. C. Hirn.
Grand Rapids	Dec. 31, 1918	Interview with Jas. R. Rumsey regarding sewage disposal at Fremont.	W. C. Hirn.
Grand Rapids	Feb. 13, 1919	Conference on sewage disposal at Fremont	E. D. Rich.
Grand Rapids	Feb. 13, 1919	Conference regarding Fremont Industrial waste disposal	W. C. Hirn.
Grand Rapids	Feb. 19, 1919	Interview with Jas. R. Rumsey regarding a design of Fremont Experimental Plant	W. C. Hirn.

TABLE NO. 4.—*Sanitary Inspections.—Continued.*

Location.	Date.	Subject.	Engineer.
Grand Rapids.....	April 3, 1919....	Conference with Jas. R. Rumsey regarding Fremont sewage disposal...	W. C. Hirn.
Grand Rapids.....	May 5, 1919.....	Conference with Jas. R. Rumsey on Fremont sewage disposal..........	W. C. Hirn.
Grosse Pointe.....	Sept. 21, 1918..	Inspected new sewage disposal works.........................	W. C. Hirn.
Grosse Pointe.....	April 7, 1919....	Sewerage.........................	J. M. Hepler.
Grosse Pointe Park	April 7, 1919....	Sewerage.........................	J. M. Hepler.
Hancock.........	Jan. 16, 1919....	Water supply purity...............	O. E. Eckert.
Harbor Beach....	July 3, 1918....	Sewage disposal..................	O. E. Eckert.
Hastings	Oct. 26, 1918....	Typhoid Investigation.............	W. C. Hirn.
Highland Park....	July 30, 1918....	Water supply.....................	W. C. Hirn.
Highland Park....	Sept. 13, 1918...	Water supply.....................	W. C. Hirn.
Highland Park....	Nov. 7, 1918....	Water............................	W. C. Hirn.
Highland Park....	Dec. 5, 1918....	Water............................	W. C. Hirn.
Highland Park....	April 22, 1919...	Water and sewerage...............	J. M. Hepler.
Hillsdale.........	July 26, 1918....	Water supply.....................	W. C. Hirn.
Holland..........	July 11, 1918....	Industrial waste nuisance..........	W. C. Hirn.
Holland..........	July 11, 1918....	Industrial waste nuisance..........	W. C. Hirn.
Holland..........	April 25, 1919...	Water supply purity...............	O. E. Eckert.
Holly............	May 1, 1919....	Water and sewerage...............	J. M. Hepler.
Houghton........	Sept. 24, 1919...	Conference with State Board of Health bacteriologist regarding Upper Peninsula public water supplies	O. E. Eckert.
Howell...........	Jan. 28, 1919....	Inspected sewer cleaning apparatus.	J. R. Daugherty.
Howell...........	Feb. 22, 1919..	Nuisance — Checking progress on sewage disposal plans............	J. R. Daugherty.
Howell...........	April 29, 1919..	Sewage disposal—State Tuberculosis sanitorium.................	J. R. Daugherty.
Howell	April 29, 1919...	Sewage disposal at Tuberculosis Sanatorium	E. D. Rich.
Howell...........	June 13, 1919..	Sewage disposal at Tuberculosis sanatorium....................	A. H. Jewell.
Hudson..........	Feb. 22, 1919....	Water extensions.................	J. R. Daugherty.
Imlay City.......	May 6, 1919.....	Water and sewerage...............	J. M. Hepler.
Ionia............	Sept. 25, 1918...	Conference on new water supply.....	W. C. Hirn.
Ionia............	Dec. 31, 1918...	Water supply at Institution for criminally insane.................	W. C. Hirn.
Ionia............	June 20, 1919....	Water purity......................	E. D. Rich.
Iron Mountain....	Sept. 18, 1918...	Water supply purity...............	O. E. Eckert.
Iron Mountain....	Jan. 20, 1919...	Water supply—Location and construction.......................	O. E. Eckert.
Iron Mountain....	May 7, 1919.....	Water supply purity...............	O. E. Eckert.
Iron River.......	Sept. 19, 1918...	Filing of plans....................	O. E. Eckert.
Ironwood........	Sept. 20, 1918...	Sewage disposal..................	O. E. Eckert.
Ironwood........	Sept. 21, 1918...	Water supply construction..........	O. E. Eckert.
Ironwood........	Jan. 17, 1919....	Water supply purity...............	O. E. Eckert.
Ironwood........	May 12, 1919...	Water supply—Location and construction.......................	O. E. Eckert.
Ishpeming.......	Sept. 28, 1918...	Water supply purity...............	O. E. Eckert.
Ithaca...........	July 23, 1918....	Sewage disposal..................	O. E. Eckert.
Ithaca...........	June 18, 1918...	Sewage disposal..................	E. D. Rich.
Ithaca...........	June 18, 1918...	Sewage disposal..................	A. H. Jewell.
Jackson..........	May 9, 1919....	Water purity......................	E. D. Rich.
Jackson..........	June 20, 1919	Chlorination and inspection........	J. R. Daugherty.
Jackson..........	June 24, 1919...	Conference on piping changes at old pumping station...............	J. R. Daugherty.
Kalamazoo.......	Aug. 2, 1918....	Garbage disposal..................	W. C. Hirn.
Kalamazoo.......	Aug. 30, 1918...	Purity of water State hospital.......	F. Gardner Legg.
Kalamazoo.......	Aug. 31, 1918...	Installing chlorination apparatus....	F. Gardner Legg.
Kalamazoo.......	Oct. 18, 1918....	Water............................	W. C. Hirn.
Kalamazoo.......	Nov. 1, 1918....	Water, State Hospital..............	O. E. Eckert.
Kalamazoo.......	Jan. 10, 1919...	Water supply and sewerage, State Hospital.........................	O. E. Eckert.
Kalamazoo.......	Jan. 10, 1919....	Filing of plans....................	O. E. Eckert.
Kalamazoo.......	Jan. 10, 1919....	Garbage collection and disposal.....	O. E. Eckert.
Kalamazoo.......	Mar. 22, 1919...	Garbage disposal..................	W. C. Hirn.
Lake Odessa......	July 9, 1918....	Trade waste disposal..............	O. E. Eckert.
Lake Odessa......	Aug. 28, 1918...	Trade waste disposal..............	O. E. Eckert.

TABLE NO. 4.—*Sanitary Inspections.—Continued.*

Location.	Date.	Subject.	Engineer.
Lake Odessa	April 15, 1919	Trade waste disposal	O. E. Eckert.
Lake Odessa	May 27, 28, 1919	Inspection of pollution of Jordan Lake	J. R. Daugherty
Lake Odessa	May 29, 1919	Inspection of sewers and Creamery waste disposal	J. R. Daugherty.
Lakeside	Aug. 15, 1918	Resort sanitation	O. E. Eckert.
L'Anse	Sept. 27, 1918	Water supply—Location and construction	O. E. Eckert.
L'Anse	Sept. 13, 1918	Sewage nuisance	W. C. Hirn.
Lansing	July 8, 1918	Inspection Lansing Piggery	E. D. Rich.
Lansing	July 10, 1918	Conference on building code	F. Gardner Legg.
Lansing	July 10, 1918	Conference on Royal Oak sewerage	F. Gardner Legg.
Lansing	July 23, 1918	Conference on pollution of Shiawassee River	E. D. Rich.
Lansing	Aug. 1, 1918	Nuisance	E. D. Rich.
Lansing	Aug. 14, 1918	Conference on Petoskey water supply	F. Gardner Legg.
Lansing	Aug. 23, 1918	Conference on sewage disposal for Government chemical plant below Grand Rapids	F. Gardner Legg.
Lansing	Sept. 7, 1918	Nuisance	F. Gardner Legg.
Lansing	Sept. 19, 1918	Conference on Michigan Home & Training School Lapeer, sewage disposal	F. Gardner Legg.
Lansing	Sept. 21, 1918	Conference on sanitation at North Port Point	F. Gardner Legg.
Lansing	Oct. 8, 1918	Conference on Northport Point water	O. E. Eckert.
Lansing	Oct. 16, 1918	Conference on creamery waste disposal, Lake Odessa	O. E. Eckert.
Lansing	Oct. 31, 1918	Conference on stream pollution	O. E. Eckert.
Lansing	Nov. 4, 1918	Conference on Northport Point water	O. E. Eckert.
Lansing	Nov. 7, 1918	Conference on stream pollution at Farwell	O. E. Eckert.
Lansing	Nov. 18, 1918	Conference on Northport Point water	O. E. Eckert.
Lansing	Nov. 23, 1918	Conference on sewage disposal at Merrill	O. E. Eckert.
Lansing	Jan. 25, 1919	Conference on Northport Point water	O. E. Eckert.
Lansing	Jan. 29, 1919	Conference on Port Huron water	O. E. Eckert.
Lansing	Feb. 12, 1919	Conference on Northport Point water	O. E. Eckert.
Lansing	Feb. 25, 1919	Conference on Northport Point water	E. D. Rich.
Lansing	Mar. 4, 1919	Northport Point water	E. D. Rich.
Lansing	Mar. 12, 1919	Plumbers' Convention	E. D. Rich.
Lansing	Mar. 12, 14, 1919	Plumbers' Convention	J. M. Hepler.
Lansing	Mar. 20, 1919	Inspection Lansing—Water works	E. D. Rich.
Lansing	Mar. 20, 1919	Consultation on Lansing water epidemic	J. R. Daugherty.
Lansing	Mar. 21-31, 1919	Sanitary survey	J. R. Daugherty.
Lansing	Mar. 24, 1919	Water chlorination	W. C. Hirn.
Lansing	Mar. 24-31, 1919	Water contamination	J. M. Hepler.
Lansing	Mar, 25, 1919	Water chlorination	W. C. Hirn.
Lansing	Mar. 25, 1919	Conference on Northport Point water	E. D. Rich.
Lansing	Mar. 29, 1919	Conference on Zeeland	E. D. Rich.
Lansing	April 1-5, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	April 8, 9, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	April 11, 1919	Conference with U. S. Public Health representative on water supply purity	E. D. Rich.
Lansing	April 12, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	April 12, 1919	Conference on Lansing sewers	E. D. Rich.
Lansing	April 14, 1919	Conference on Lansing sewers.	E. D. Rich.
Lansing	April 15 to 28, 1919	Epidemic investigation	J. R. Daugherty.

TABLE NO. 4.—*Sanitary Inspections.—Continued.*

Location.	Date	Subject.	Engineer.
Lansing	April 16, 1919	Conference on Merrill sewerage	O. E. Eckert.
Lansing	April 22, 1919	Conference on chlorination of Lansing water with C. A. Jennings	E. D. Rich.
Lansing	April 30 to May 5, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	May 1, 1919	Conference on Fremont sewage disposal	E. D. Rich.
Lansing	May 2, 1919	Conference on General Clean-up for Saginaw	E. D. Rich.
Lansing	May 8, 1919	Conference on Boyne City sewers	E. D. Rich.
Lansing	May 19, 1919	Conference with Kaustine representative	J. M. Hepler.
Lansing	May 19, 1919	Conference on St. Clair water	E. D. Rich.
Lansing	May 20, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	May 20, 1919	Conference on filing of plans	E. D. Rich.
Lansing	May 20, 1919	Conference on Holland water maps	E. D. Rich.
Lansing	May 23, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	May 26, 1919	Epidemic Investigation	J. R. Daugherty.
Lansing	May 30-31, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	June 1, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	June 3, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	June 5, 1919	Conference on Sturgis sewage disposal	E. D. Rich.
Lansing	June 7, 1919	Address before Plumbers' Union	E. D. Rich.
Lansing	June 10, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	June 11, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	June 12, 1919	Conference on Northport Point water purity	E. D. Rich.
Lansing	June 14, 1919	Conference on Jackson water purity	E. D. Rich.
Lansing	June 23, 1919	Conference on Boyne City sewer maps	J. M. Hepler.
Lansing	June 27, 1919	Epidemic investigation	J. R. Daugherty.
Lansing	June 28, 1919	Inspection N. Y. Central Yards water supply	J. R. Daugherty.
Lapeer	Aug. 6, 1918	Sewage disposal Michigan Home and Training School	F. Gardner Legg.
Lapeer	Sept. 10, 1918	Michigan Home and Training School sewage disposal	F. Gardner Legg.
Lapeer	Oct. 9, 1918	Michigan Home and Training School sewage disposal	O. E. Eckert.
Lapeer	May 6, 1919	Water and sewerage	J. M. Hepler.
Lapeer	May 26, 1919	Michigan Home and Training School sewage disposal	A. H. Jewell.
Leslie	Feb. 21, 1919	Water and sewer extensions	J. M. Hepler.
Ludington	Feb. 1, 1919	Water chlorination	W. C. Hirn.
Macatawa Park	July 11, 1918	Sewerage	W. C. Hirn.
Macatawa Park	June 6, 1919	Sewerage	W. C. Hirn.
Mackinac Island	Sept. 2-3, 1918	Resort sanitation	O. E. Eckert.
Manchester	Feb. 21, 1919	Water and sewer extensions	J. M. Hepler.
Manistee	June 6, 1919	Water and sewerage	J. M. Hepler.
Manistique	May 16, 1919	Water purification	W. C. Hirn.
Marine City	July 31, 1918	Water supply	W. C. Hirn.
Marine City	Sept. 14, 1918	Water supply	W. C. Hirn.
Marine City	Nov. 5, 1918	Water	W. C. Hirn.
Marine City	Dec. 4, 1918	Water	W. C. Hirn.
Marine City	Jan, 24, 1919	Water chlorination	W. C. Hirn.
Marine City	Feb. 27, 1919	Water—Laboratory inspection	W. C. Hirn.
Marine City	Mar. 8, 1919	Water—Laboratory inspection	W. C. Hirn.
Marine City	April 23, 1919	Water and sewerage	J. M. Hepler
Marine City	May 26, 1919	Water purification	W. C. Hirn.
Marine City	June 13, 1919	Water purification	W. C. Hirn.
Mason	April 29, 1919	Public address before Women's Civic Club on "Sanitation."	E. D. Rich.
Menominee	Aug. 14, 1918	Water supply	W. C. Hirn.
Menominee	Sept. 16, 1918	Water supply construction	O. E. Eckert.
Menominee	Jan. 12, 1919	Water supply purity	O. E. Eckert.
Merrill	Jan. 30, 1919	Sewerage	O. E. Eckert.
Merrill	May 29, 1919	Sewerage	A. H. Jewell.
Midland	Jan. 28, 1919	Water supply—Location and construction	O. E. Eckert.
Midland	Mar. 26, 1919	Stream and lake pollution	E. D. Rich.

TABLE NO. 4.—*Sanitary Inspections.—Continued.*

Location.	Date	Subject.	Engineer.
Milwaukee, Wis...	Aug. 13, 1918...	Conference with T. Chalkley Hatton on sewage disposal	W. C. Hirn.
Milwaukee, Wis...	Jan. 20, 1919....	Conference with T. Chalkley Hatton on activated sludge sewage disposal	O. E. Eckert.
Minden City.....	May 8, 1919....	Water and sewerage...............	J. M. Hepler.
Monroe..........	July 24, 1918...	Water supply....................	W. C. Hirn.
Monroe..........	Nov. 6, 1918....	Water...........................	W. C. Hirn..
Monroe..........	Feb. 6, 1919....	Water supply purity and construction.	O. E. Eckert.
Monroe..........	Mar. 18, 1919...	Water..........................	O. E. Eckert.
Morenci..........	Feb. 7, 1919.....	Sewerage........................	O. E. Eckert.
Mt. Pleasant	Feb. 14, 1919...	Water supply construction..........	O. E. Eckert.
Mt. Pleasant.....	Feb. 15, 1919...	Sewerage........................	O. E. Eckert.
Mt. Pleasant.....	April 18-19, 1919	Sewerage. Water—Location and construction..................	O. E. Eckert.
Mt. Pleasant.....	June 5, 1919....	Investigated cause of use of river water. Inspection of wells and pumps.	J. R. Daugherty.
Mt. Pleasant.....	June 25, 1919...	Conference on proposed sewer construction....................	J. R. Daugherty.
Muir............	Jan. 15, 1919....	Water and sewer extensions..........	J. R. Daugherty.
Munising	Sept. 30, 1918 ..	Chlorination inspection............	O. E. Eckert.
Muskegon........	Feb. 14, 1919...	Ice purity......................	W. C. Hirn.
Muskegon........	March 25-26, 1919	Water purity....................	O. E. Eckert.
Muskegon........	April 11, 1919...	Water purity....................	O. E. Eckert.
Muskegon........	June 3, 1919....	Water purity....................	W. C. Hirn..
Muskegon........	June 3-4, 1919...	Water and sewerage...............	J. M. Hepler.
Muskegon........	June 26, 1919...	Water purity....................	W. C. Hirn.
Muskegon Heights........	Aug. 1, 1918....	Sewerage and sewage disposal........	O. E. Eckert.
Negaunee........	Sept. 28, 1918...	Water supply purity...............	O. E. Eckert.
Negaunee........	Jan. 15, 1919....	Sewerage along Teel Lake..........	O. E. Eckert.
Negaunee........	May 16, 1919...	Sewers along Teel Lake...........	O. E. Eckert.
New Baltimore...	July 31, 1918....	Sewage disposal..................	W. C. Hirn.
Niles............	Aug. 14, 1918...	Water supply purity..............	O. E. Eckert.
Niles............	Dec. 12, 1919...	Water..........................	W. C. Hirn.
Niles............	Mar. 6, 1919....	Sewerage........................	O. E. Eckert.
Niles............	April 23, 1919...	Sewerage	O. E. Eckert.
Niles............	June 17, 1919...	Water and sewerage..............	J. M. Hepler.
Northport Point..	Aug. 27, 1918...	Resort sanitation.................	F. Gardner Legg.
Norhtport Point..	June 5-6, 1919...	Water supply purity	A. H. Jewell.
Oakland.........	May 8, 1919....	Inspection of district for proposed sewers.......................	J. R. Daugherty.
Oakwood.........	April 22, 1919...	Sewerage.......................	J. M. Hepler.
Ontonagon.......	Aug. 16, 1918...	Sewage disposal for County institution..........................	O. E. Eckert.
Ontonagon.......	Sept. 23, 1918...	Institutional sewage disposal........	O. E. Eckert.
Ontonagon.......	May 14, 1919...	Water supply purity..............	O. E. Eckert.
Otsego..........	Mar. 18, 1919...	Checking progress on new wells and provision for treating water........	J. R. Daugherty.
Otsego..........	Mar. 19. 1919...	Consultation in this office with new village manager................	J. R. Daugherty.
Otsego..........	Feb. 17, 1919....	Typhoid fever inspection...........	J. R. Daugherty.
Otsego..........	Feb. 20, 1919...	Sanitary survey and consultation.....	J. R. Daugherty.
Otsego..........	Feb. 27, 1919....	Water supply....................	E. D. Rich.
Owosso..........	Mar. 4, 1919....	Sewerage and filing of plans.........	O. E. Eckert.
Painesdale.......	Aug. 17, 1919...	Conference on Painsdale, South Range, Baltic and Trimountain water....................	W. C. Hirn.
Painesdale.......	Sept. 25, 1918...	Sewage disposal..................	O. E. Eckert.
Perrinton........	June 17, 1919...	Nuisance........................	A. H. Jewell.
Perrinton........	June 17, 1919...	Trade waste disposal..............	E. D. Rich.
Petoskey.........	Aug.24-26, 1918.	Water supply purity and development........................	F. Gardner Legg.
Petoskey.........	Aug. 30-31, 1918.	Water supply purity..............	O. E. Eckert.
Petoskey.........	Jan. 29, 1919....	Water chlorination................	W. C. Hirn.
Petoskey.........	April 9, 1919....	Water purification................	W. C. Hirn.
Pine Lake........	Aug. 13, 1918...	Nuisance at resort................	F. Gardner Legg.
Plymouth........	May 22, 1919...	Water supply purity..............	A. H. Jewell.
Plymouth........	June 13, 1919...	Water supply purity..............	A. H. Jewell.
Plymouth........	June 24, 1919...	Water supply purity..............	A. H.Jewell.
Pontiac..........	July 29, 1918...	Sewage disposal..................	O. E. Eckert.
Pontiac..........	Sept. 3-4, 1918..	Sewage disposal..................	W. C. Hirn.
Pontiac..........	Jan. 2, 1919.....	Testifying in Court on pollution of Clinton River and sewage disposal.	O. E. Eckert.

TABLE NO. 4.—*Sanitary Inspections.—Continued.*

Location.	Date.	Subject.	Engineer.
Pontiac	April 8, 1919	Water and sewerage	J. M. Hepler.
Pontiac	April 22, 1919	Drainage	J. M. Hepler.
Port Huron	Oct. 11, 1918	Water	W. C. Hirn.
Port Huron	Nov. 9, 1918	Water supply	O. E. Eckert.
Port Huron	Dec. 2, 1918	Water	O. E. Eckert.
Port Huron	Dec. 20,1918	Water and sewerage	O. E. Eckert.
Quincy Mines	Aug. 19, 1918	Water supply	W. C. Hirn.
Reed City	May 8, 1919	Water purity	W. C. Hirn.
Reed City	June 6, 1919	Water and sewerage	J. M. Hepler.
River Rouge	April 9, 1919	Sewerage	J. M. Hepler.
Royal Oak	April 8, 1919	Water and sewerage	J. M. Hepler.
Saginaw	Nov. 25, 1918	Conference on water	O. E. Eckert.
Saginaw	Jan. 27, 1919	Sewerage	O. E. Eckert.
Saginaw	Mar. 3, 1919	Sewerage	O. E. Eckert.
Sandusky	June 12, 1919	Nuisance	W. C. Hirn.
Sault Ste. Marie	Oct. 1, 1918	Water chlorination	O. E. Eckert.
Sault Ste. Marie	Jan. 18, 1919	Water chlorination	W. C. Hirn.
Sault Ste. Marie	May 15, 1919	Water purification	W. C. Hirn.
Selfridge Aviation Field	Sept. 13, 1919	Sewage disposal and water supply	W. C. Hirn.
Selfridge Field	Mar. 7, 1919	Water purity—sewage disposal	W. C. Hirn.
Shelby	July 3, 1918	Nuisance—Inspection of water supply—Canning factory and creamery waste disposal	F. Gardner Legg.
Shepherd	Aug. 24, 1918	Nuisance	O. E. Eckert.
Sheridan	July 23, 1918	Trade waste disposal	O. E. Eckert.
South Haven	July 9, 1918	Water supply	W. C. Hirn.
South Haven	Oct. 22, 1918	Laboratory	W. C. Hirn.
South Haven	Dec. 14, 1918	Water	W. C. Hirn.
South Haven	Jan. 6, 1919	Public Address on general sanitation	O. E. Eckert.
South Haven	Jan. 7, 1919	Chlorination inspection	O. E. Eckert.
South Haven	Mar. 21, 1919	Water—Laboratory inspection	W. C. Hirn.
South Haven	June 18, 19, 1919	Water—Sewerage dairy waste	J. M. Hepler.
South Haven	June 28, 1918	Water purification	W. C. Hirn.
Spring Lake	Aug. 2, 1919	Conference on sewerage	O. E. Eckert.
Stambaugh	Sept. 19, 1918	Water supply purity	O. E. Eckert.
Stambaugh	Jan. 19, 1919	Water supply purity	O. E. Eckert.
Stambaugh	May 9, 1919	Chlorination of water	O. E. Eckert.
Standish	July 24, 1918	Stream pollution	O. E. Eckert.
Stockbridge	June 11, 1919	Water and sewerage	J. M. Hepler.
St. Charles	May 9, 1919	Water	J. M. Hepler.
St. Clair	Oct. 12, 1918	Water	W. C. Hirn.
St. Clair	Nov. 21, 1918	Water	W. C. Hirn.
St. Clair	Dec. 1, 1918	Water	O. E. Eckert.
St. Clair	Dec. 4, 1918	Chlorination	W. C. Hirn.
St. Clair	Dec. 19, 1918	Water	O. E. Eckert.
St. Clair	Jan. 23, 1919	Water chlorination	W. C. Hirn.
St. Clair	Jan. 21, 1919	Inspection of pumping station	J. R. Daugherty.
St. Clair	June 22, 1919	Installation of emergency chlorine machine—Inspection of filter plant at Diamond Crystal Salt Co.	J. R. Daugherty.
St. Clair Heights	April 23, 1919	Water and sewerage	J. M. Hepler.
St. Johns	July 19, 1918	Sewerage and sewage disposal	O. E. Eckert.
St. Johns	Jan. 15, 1919	Water and sewer extensions	W. C. Hirn.
St. Johns	June 17, 1919	Sewerage	E. D. Rich.
St. Johns	June 17, 1919	Nuisance	A. H. Jewell.
St. Joseph	July 5, 1918	Filtration of water supply	F. Gardner Legg.
St. Joseph	July 10, 1918	Water supply	W. C. Hirn.
St. Joseph	Oct. 23, 1918	Water	W. C. Hirn.
St. Joseph	Dec. 13, 1918	Water	W. C. Hirn.
St. Joseph	Mar. 7, 1919	Conference with W. J. Cleary regarding Niles sewerage	O. E. Eckert.
St. Joseph	Mar. 7, 1919	Conference with Mr. Hampton regarding Bridgeman sewerage	O. E. Eckert.
St. Joseph	Mar. 7, 1919	Chlorination inspection	O. E. Eckert.
St. Joseph	Mar. 20, 1919	Sewerage	W. C. Hirn.

TABLE NO. 4.—*Sanitary Inspections.—Continued.*

Location.	Date	Subject.	Engineer.
St. Joseph	June 27, 1919	Water purification	W. C. Hirn.
St. Louis	June 18, 1919	Water supply—Location and construction—Stream and Lake pollution	E. D. Rich.
St. Louis	June 18, 1919	Water supply—Stream and lake pollution	A. H. Jewell.
Sylvan lake	July 29, 1918	Resort sanitation	O. E. Eckert.
Temperance	July 27, 1918	Dairy waste disposal	W. C. Hirn.
Three Oaks	May 29, 1919	Water and sewerage	J. M. Hepler.
Toledo	Dec. 2,1918	Interview regarding Dundee water	W. C. Hirn.
Traverse City	Jan. 30, 1919	Water purity	W. C. Hirn.
Traverse City	April 10, 1919	Water purification	W. C. Hirn.
Trenton	Sept. 20, 1918	Sewage nuisance	W. C. Hirn..
Trenton	Oct. 5, 1918	Nuisance—Sewerage	W. C. Hirn.
Trenton	April 24, 1919	Sewerage	J. M. Hepler.
Wakefield	Jan. 17, 1919	Water supply—Location and construction	O. E. Eckert.
Wakefield	May 13, 1919	Water supply purity—Location and construction	O. E. Eckert.
Walker Twp	July 2, 1918	School house sewage disposal and sanitation	F. Gardner Legg.
Walker Twp	Oct. 2, 1918	Schoolhouse sanitation	F. Gardner Legg.
Wayne	Aug. 16, 1918	Sewage disposal nuisance	F. Gardner Legg.
Wayne	Mar. 5-6 1919	Water	W. C. Hirn.
Wayne	April 3, 1919	Water and sewerage	J. M. Hepler.
Wayne	April 21, 1919	Water and sewerage	J. M. Hepler.
White Cloud	Aug. 2, 1918	Nuisance	O. E. Eckert.
White Cloud	June 5, 1919	Water	J. M. Hepler.
Williamston	Mar. 28, 1919	Typhoid Fever investigation	O. E. Eckert.
Williamston	April 2, 1919	Typhoid Fever investigation	O. E. Eckert.
Williamston	June 18, 1919	Typhoid Fever investigation	W. C. Hirn.
Wyandotte	July 18, 1919	Water purification	E. D. Rich.
Wyandotte	July 18, 1919	Water supply	W. C. Hirn.
Wyandotte	Aug. 23, 1919	Water supply	W. C. Hirn.
Wyandotte	Sept. 5, 1919	Water works extension	F. Gardner Legg.
Wyandotte	Sept. 12, 1919	Address to council on bonds for filtration	F. Gardner Legg.
Wyandotte	Sept. 20, 1919	Water supply	W. C. Hirn.
Wyandotte	Oct. 5, 1919	Water—Address at Detroit Shipbuilding plant	W. C. Hirn.
Wyandotte	Nov. 6, 1919	Water	W. C. Hirn.
Wyandotte	Dec. 5, 1919	Water	W. C. Hirn.
Wyandotte	Jan. 25, 1919	Water chlorination	W. C. Hirn.
Wyandotte	Feb. 26, 1919	Water purification	W. C. Hirn.
Wyandotte	May 28, 1919	Water purification	W. C. Hirn.
Yale	May 7, 1919	Water and sewerage	J. M. Hepler.
Zeeland	Feb. 6, 1919	Water and sewerage—Filing of plans	W. C. Hirn.

BUREAU OF LABORATORIES

LANSING LABORATORY REPORT FOR THE FISCAL YEAR ENDING JUNE 30, 1919.

Chemical and bacteriological examinations for potability:		
Number of uncontaminated samples of water reported safe	1,036	
Number of contaminated samples of water reported unsafe	604	
Total		1,640
Blood samples examined for Widal's reaction:		
Positive	206	
Negative	545	
Total		751
Blood samples examined for Wassermann's reaction:		
Positive	2,619	
Negative	9,566	
Doubtful	73	
Total		12.258
Throat swabs examined for diphtheria bacilli:		
Positive	2.270	
Negative	4,195	
Total		6,465
For diagnosis, 2,595; 860 positive, 1,789 negative.		
For release, 3,870: 1,464 positive, 2,406 negative.		
Sputa examined for tubercle bacilli:		
Positive	610	
Negative	2,245	
Total		2,855
Smears examined for gonococci:		
Positive	1.203	
Negative	10,492	
Total		11,695
Blood	63	
Feces	25	
Ice	7	
Milk	197	
Tissues	29	
Spinal Fluids	9	
Beverages	3	
Urines	526	
Toxicological	10	
Stomach Contents	11	
Miscellaneous	109	
Total		989
Grand total number of examinations		36,653
Mailing outfits sent out during the year:		
Sputa		2,783
Diphtheria		6.756
Typhoid		1,958
Syphilis		8,196
Slides for Gonorrheal Smears		947
Water Cases		26

HOUGHTON LABORATORY REPORT FOR FISCAL YEAR ENDING JUNE 30, 1919.

Chemical examinations of water		1
Bacteriological examinations for potability:		
Number of uncontaminated samples of water reported safe	227	
Number of contaminated samples of water reported unsafe	174	
Total		401
Blood samples examined for Widal's reaction:		
Positive	22	
Negative	53	
Total		75
Blood samples for Wassermann's reaction:		
Positive	83	
Negative	127	
Total		210
Throat swabs examined for diphtheria bacilli:		
Positive	34	
Negative	75	
Total		109
For diagnosis, 86: positive, 22; negative, 64.		
For release, 23: positive, 11; negative, 12.		
Sputa examined for tubercle bacilli:		
Positive	175	
Negative	496	
Total		671
Sputa examined for pneumococcus:		
Positive	5	
Negative	0	
Total		5
Smears examined for gonococci:		
Positive	73	
Negative	145	
Total		218
Autogenous Vaccines	23	
Blood Counts	86	
Feces	12	
Ice	3	
Milk	62	
Beverage for alcohol	42	
Spinal Fluid	10	
Urines	41	
Toxicological	6	
Stomach Contents	45	
Miscellaneous	33	
Total		363
Grand total number of examinations		2,053
Mailing outfits sent out:		
Sputa		743
Diphtheria		207
Typhoid		180
Syphilis		287
Slides for Gonorrheal Smears		64
Water Cases		87

SUMMARY OF EXAMINATIONS ARRANGED BY MONTHS.

Months.	Water.		Sputa tuberculosis.		Throat swabs diphtheria.		Blood Widal's reaction.		Blood Wassermann's reaction.			Smears venereal.		Miscellaneous	Total
	Safe	Unsafe	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Doubtful	Pos.	Neg.		
July, 1918	52	43	53	182	173	245	16	60	252	815	10	52	492	55	2,500
August, 1918	44	78	56	172	221	207	21	55	197	840	16	87	531	83	2,608
September, 1918	55	46	42	114	253	380	31	52	183	634	5	88	416	74	2,373
October, 1918	65	45	34	130	321	602	28	66	151	558	7	154	654	83	2,898
November, 1918	40	28	40	138	219	416	8	29	203	470	5	107	507	59	2,269
December, 1918	26	5	39	124	186	387	16	15	165	545	6	102	341	54	2,011
January, 1919	48	16	61	185	132	322	9	25	194	770	4	142	865	49	2,822
February, 1919	49	10	50	205	151	360	8	23	194	768	4	88	991	73	2,974
March, 1919	109	67	52	209	163	463	9	20	259	898	8	55	1,015	75	3,402
April, 1919	151	85	71	244	95	206	43	92	260	1,088	5	83	902	144	3,469
May, 1919	181	81	56	294	190	396	14	65	274	1,242	2	58	1,005	150	4,008
June, 1919	216	100	56	248	166	211	3	43	287	938	1	187	2,773	90	5,319
Total	1,036	604	610	2,245	2,270	4,195	206	545	2,619	9,566	73	1,203	10,492	989	36,653

Summary examinations for year ending June 30, 1919, as compared with summary examinations for year ending June 30, 1918:

	1919.	1918.
Chemical and bacteriological examinations of water for potability...	1,640	1,445
Sputa examined for tubercle bacilli....................................	2,855	2,870
Throat swabs examined for diphtheria bacilli........................	6,465	5,330
Blood samples examined for Widal's reaction........................	751	755
Blood samples examined for Wassermann's reaction.................	12,258	7,918
Smears examined for gonococci..	11,695	636
Chemical and microscopical examinations of urine..................	526	273
Pathological examinations of feces....................................	25	22
Pathological examinations of tissues..................................	29	51
Miscellaneous blood examinations....................................	63	72
Chemical and bacteriological examinations of milk..................	197	106
Toxicological and medico-legal examinations........................	10	7
Beverages	3	15
Stomach Contents	11	13
Spinal Fluids	9	15
Ice	7	3
Miscellaneous	109	159
Grand total number of examinations..........................	36,653	19,690

SUMMARY OF WATER EXAMINATIONS FOR THE YEAR ENDING JUNE 30, 1919.

Location.	Safe.	Unsafe.	No. examined.
Ada	0	1	1
Addison	1	1	2
Adrian	1	0	1
Albion	2	1	3
Allegan	4	0	4
Alma	10	5	15
Alpena	6	2	8
Argentine	0	1	1
Bad Axe	1	0	1
Baltimore Township	1	0	1
Bark River Township	1	0	1
Bath Township	0	1	1
Battle Creek	24	2	26
Bay Port	0	5	5
Bay View	1	3	4
Beaverton	1	0	1
Bellevue	3	0	3
Benton Township	0	4	4
Bethel	1	0	1
Birmingham	1	7	8
Blissfield	0	2	2
Blumfield Township	0	1	1
Breakes Summer Resort	0	1	1
Breckenridge	0	2	2
Bronson	0	1	1
Brooklyn	5	5	10
Buchanan	0	1	1
Cadillac	20	30	56
Camden	1	1	2
Capac	1	1	2
Cassopolis	0	1	1
Cedar Lake	0	1	1
Charlevoix	0	2	2
Charlotte	3	0	3
Cheboygan	0	1	1
Chelsea	2	1	3
Clio	0	1	1
Coldwater	1	0	1
Coloma	1	0	1
Constantine	4	1	5
Corunna	1	0	1
Crystal Falls	0	1	1
Dansville	0	1	1
Davison	0	1	1
Decker	0	1	1
Deckerville	1	0	1
Detroit	2	0	2
Dimondale	1	1	2
Dublin	2	2	4
Deerfield Township	0	2	2
East Lansing	2	0	2
East Tawas	3	3	6
Eaton Rapids	11	2	13
Fenton	1	0	1

Location.	Safe.	Unsafe.	No. examined.
Ford Village	0	4	4
Frankfort	1	0	1
Fremont	0	1	1
Gerrish Township	1	0	1
Glenn	0	1	1
Grand Ledge	1	0	1
Grand Rapids	0	1	1
Hanover	0	1	1
Harbor Beach	2	5	7
Hastings	2	3	5
Hemlock	1	1	2
Henderson	1	0	1
Holland	33	8	41
Homer	1	0	1
Hope	0	1	1
Ida	1	3	4
Imlay City	1	1	2
Ionia	19	3	22
Iron River	3	1	4
Jackson	10	6	16
Jennings	0	1	1
Kalamazoo	7	4	11
Kinde	1	0	1
Lake City	1	0	1
Lakeside	5	2	7
Lansing	433	181	614
Lansing R. F. D.	4	2	6
Lapeer	0	1	1
Mackinac Island	1	0	1
Macon	3	0	3
Mancelona	1	0	1
Manistee	5	0	5
Maple Rapids	0	1	1
Marcellus	0	1	1
Marine City	1	0	1
Meafort	1	2	3
Merrill	0	1	1
Midland	4	3	7
Millbrook	1	0	1
Monroe	0	2	2
Montague	1	0	1
Morley	1	0	1
Mt. Clemens	4	5	9
Mt. Pleasant	0	2	2
Munising	2	0	2
Muskegon	2	6	8
Muskegon Heights	6	0	6
Nadeau	1	0	1
New Era	3	0	3
New Haven Township	2	0	2
New Lothrop	0	1	1
Niles	26	14	40
Northport	1	0	1
Northport Point	15	30	45
Norway	3	0	3

Location.	Safe.	Unsafe.	No. examined.
Norvell Township	0	2	2
Okemus	1	0	1
Otsego	6	8	14
Owosso	1	0	1
Oxford	1	0	1
Palo	1	0	1
Paw Paw	3	0	3
Petersburg	0	3	3
Petoskey	15	5	20
Pleasant Lake	2	3	5
Plymouth	6	14	21
Pompeii	0	1	1
Pontiac	5	8	13
Portland	5	3	8
Powers	0	2	2
Pullman	0	1	1
Quincy	0	1	1
Railroads:			
Ann Arbor R. R.	10	3	13
Arcadia & Betsey River	1	0	1
Benton Harbor & St. Joe	2	1	3
Big Four	2	0	2
Boyne City, Gaylord & Alpena	3	3	6
Chicago, Kalamazoo & Saginaw	1	0	1
Cincinnati Northern	0	1	1
Detroit, Bay City & Western	4	0	4
Detroit & Mackinaw	10	3	13
Detroit, Toledo & Ironton	1	2	3
Detroit United Railway	16	15	31
Grand Rapids & Indiana	9	4	13
Grand Rapids, Grand Haven & Muskegon	1	2	3
Grand Trunk	24	10	34
Kalamazoo, Lake Shore & Chicago	1	0	1
Manistee & N. Eastern	6	0	6
Michigan Central	30	16	46
Michigan E. & W.	2	0	2
Michigan Railway	19	3	22
New York Central	22	17	39
Pere Marquette	28	10	38
Saginaw & Bay City	1	0	1
Wabash	1	0	1
Richfield Township	0	1	1
Richland Township	0	1	1
Rogers	1	0	1
Rogers City	3	1	4
Saginaw	5	7	12
St. Charles	0	1	1
St. Ignace	0	1	1
St. Johns	0	1	1
St. Joseph	1	0	1
St. Louis	1	0	1
Saline	0	1	1
Sand Creek	1	1	2
Sandusky	4	1	5
Shelby	1	0	1
Sherman	0	1	1
Sherwood	1	0	1
South Lyon	3	0	3
Sparta	0	3	3

Location	Sase.	Unsafe.	No. examined.
Springfield Township	0	1	1
Stockbridge	0	2	2
Three Oaks	6	5	11
Three Rivers	6	7	13
Traverse City	5	0	5
Union City	0	1	1
Wayland	1	0	1
Wayne	0	4	4
Webberville	3	1	4
Williamston	13	7	20
Windsor Township	0	1	1
Woodland	2	0	2
Wyandotte	4	1	5
Ypsilanti	2	0	2
Zeeland	4	2	6
Totals	1,036	604	1,640

CHEMICAL EXAMINATIONS OF WATER.

Ashley, February, 1919	1
Constantine, September, 1919	1
Holland, February, 1919	2
Holland, June, 1919	1
Imlay City, June, 1919	1
Jackson, October, 1918	1
Jackson, June, 1919	2
Kalamazoo, June, 1919	1
Manistee, September, 1918	1
Otsego, June, 1919	1
Owosso, March, 1919	1
Sandusky, March, 1919	1
Three Rivers, October, 1918	1
Ypsilanti, August, 1918	1

C. C. YOUNG,
Director of Laboratories.

BUREAU OF COMMUNICABLE DISEASES

FOR YEAR ENDING DECEMBER 31, 1918.

TUBERCULOSIS IN MICHIGAN, IN 1918 AND PRECEDING YEARS.

At the close of the year 1918, there were recorded in the office of the State Board of Health the names and other data pertaining to 18,441 persons who had been reported as being sick with some form of tuberculosis, in Michigan, and were still living at the close of 1918.

At the beginning of the year 1916, this office had on file 6,391 living cases of tuberculosis. This number of cases corresponded to a case rate of 210 persons to every 100,000 estimated population. The Tuberculosis Survey (which was active through this year and up to July, 1917) increased the number of reported persons suffering with this disease and who were still living at the close of 1916 from 6,391 to 11,850, which was an increase of 5,459 or 86.5 per cent. During the following year, 1917, although the Tuberculosis Survey was not active throughout the entire year, the number of persons reported to this office as being afflicted with some form of tuberculosis and who were still living at the close of 1917 numbered 15,582; this number corresponds to a case rate of 504.0 per 100,000 population. The number of living cases reported during the year 1917 was 3,732.

During the year 1918 the number of living cases on file in the office was increased to 18,441, which was an increase of 2,859 or 18.3 per cent, as will be noted by reference to Table No. 1. In Table No. 1 is shown the number of reported living cases of tuberculosis in the State, as a whole, in each county, by geographical sections and by sex for each. For the year 1918 the case rate for the State was 580.6 per 100,000 population and for the various geographical sections of the State was as follows: Upper Peninsula (560.1), Northern Counties (276.3), Central Counties (348.7), and the Southern Counties (697.6). The error in these case rates (especially for some of the counties included in the Southern section) lies in the difference between the correct and estimated population; our estimated population for some of the largest cities of the State is too low, consequently the rates that have been applied to same are too high. In considering which sex shows the greater susceptibility to this disease, by referring to Table No. 1 it may be noted that of all the counties in the State 75 per cent of them show that this disease is more prevalent among the females than the males; while in some of our largest cities the reverse conditions seem to be true.

Although the Tuberculosis Survey was not in existence during the year 1918, still we had 2,859 (which is an increase of 18.3 per cent) persons reported as living cases of tuberculosis at the close of the year. These new living cases can be credited to the Tuberculosis Survey work, for during the two years that this survey was in existence a great impression as to the danger of this disease was so stamped on the minds of the people of this State that it will never be forgotten, and as time goes by we are realizing more and more the necessity of proper care for all persons suffering with this disease. Just stop for one moment to consider that this department had on file at the beginning of 1919 the names and other data pertaining to 18,441 persons who were afflicted with tuberculosis in some form, and furthermore, this number is increasing by approximately 3,000 each year. This is a fact that is worthy of your careful consideration.

TABLE NO. 1.—*Showing the number of living cases of tuberculosis (all forms) by sex, reported to and on file in the office of this department, in each of the counties of Michigan at the close of the years 1917 and 1918, together with the case rates per 100,000 population by counties.*

State and counties by geographical sections.	Living cases of Tuberculosis, 1917.			Total cases per 100,000 of total population.	Living cases of Tuberculosis, 1918.			Total cases per 100,000 of total population.
	Total.	Males.	Females.		Total.	Males.	Females.	
STATE OF MICHIGAN.....	**15,582**	**8,258**	**7,324**	**504.0**	**18,442**	**9,975**	**8,466**	**580.6**
I. UpperPeninsula Counties	**1,921**	**896**	**1,025**	**515.5**	**2,125**	**1,011**	**1,114**	**560.1**
Alger....................	63	27	36	708.1	69	31	38	752.4
Baraga..................	39	9	30	523.6	40	10	30	524.0
Chippewa...............	137	66	71	512.0	145	72	73	535.5
Delta....................	179	77	102	516.6	181	78	103	513.1
Dickinson...............	134	52	82	591.7	137	56	81	595.3
Gogebic.................	110	59	51	390.4	116	64	52	402.2
Houghton...............	482	254	228	462.6	624	340	284	586.0
Iron.....................	57	25	32	289.8	60	27	33	295.7
Keweenaw...............	22	13	9	220.0	23	14	9	222.5
Luce.....................	48	15	33	1,011.2	48	17	31	989.7
Mackinac...............	35	19	16	337.4	36	20	16	341.9
Marquette..............	343	178	165	676.4	371	178	193	724.1
Menominee.............	146	54	92	590.9	149	56	93	607.4
Ontonagon..............	24	9	15	229.9	24	9	15	224.6
Schoolcraft.............	102	39	63	1,100.6	102	39	63	1,090.1
II. Northern Counties......	**949**	**399**	**550**	**269.1**	**985**	**425**	**560**	**276.3**
Alcona...................	5	3	2	87.5	5	3	2	87.5
Alpena..................	82	29	53	386.5	84	29	55	392.8
Antrim..................	31	12	19	206.0	31	10	21	207.2
Arenac..................	8	2	6	81.6	9	5	4	91.0
Benzie..................	17	12	5	150.0	17	12	5	148.7
Charlevoix..............	90	44	46	392.6	87	42	45	371.4
Cheboygan..............	91	39	52	463.6	96	42	54	483.1
Clare....................	15	5	10	151.7	16	5	11	160.4
Crawford................	3	3	......	64.4	3	3	......	63.0
Emmett..................	87	35	52	424.8	98	51	47	472.3
Gladwin.................	7	4	3	71.7	9	3	6	90.4
Grand Traverse..........	84	33	51	320.6	89	36	53	335.3
Iosco....................	6	4	2	63.7	5	3	2	53.3
Kalkaska................	10	3	7	113.6	10	4	6	112.4
Lake.....................	6	3	3	121.8	6	3	3	121.7
Leelanau................	24	10	14	225.5	24	10	14	225.4
Manistee................	95	36	59	367.1	98	35	63	365.8
Mason...................	132	46	86	550.4	135	47	88	555.9
Missaukee...............	17	10	7	147.2	22	13	9	188.3
Montmorency............	20	10	10	483.6	22	10	12	525.8
Ogemaw..................	6	2	4	61.6	8	3	5	81.2
Osceola..................	17	10	7	94.9	17	9	8	172.5
Oscoda..................	1	......	1	41.0	2	1	1	80.1
Otsego..................	18	11	7	263.6	18	11	7	262.1
Presque Isle.............	34	15	19	261.1	34	16	18	256.3
Roscommon..............	4	3	1	152.1	4	3	1	149.3
Wexford.................	39	15	24	122.7	36	14	22	149.8
III. Central Counties........	**1,517**	**638**	**879**	**323.8**	**1,640**	**698**	**942**	**348.7**
Bay......................	259	117	141	357.2	275	123	152	376.2
Gratiot..................	108	39	69	385.1	112	39	73	400.1
Huron...................	119	52	67	338.1	121	53	68	343.2
Isabella.................	41	20	21	176.7	47	23	24	202.3
Mecosta.................	135	41	94	727.0	151	54	97	818.6
Midland.................	30	15	15	219.2	32	15	17	234.7
Montcalm...............	64	26	38	202.7	72	30	42	228.5
Muskegon...............	150	72	78	347.5	165	75	90	379.1
Newaygo................	77	26	51	378.4	79	28	51	385.2
Oceana..................	39	16	23	197.5	40	17	23	200.0
Saginaw.................	315	150	165	331.0	364	172	192	379.2
Sanilac..................	85	32	53	256.7	86	36	50	260.6
Tuscola..................	95	32	63	277.7	96	33	63	282.4
IV. Southern Counties.....	**11,195**	**6,325**	**4,870**	**537.2**	**13,691**	**7,841**	**5,850**	**697.6**
Allegan..................	121	56	65	298.4	127	60	67	312.4
Barry....................	98	24	74	431.5	101	25	76	444.6
Berrien..................	262	107	155	475.7	289	118	171	510.6
Branch..................	124	50	74	516.7	135	59	76	567.9

TABLE NO. 1—*Concluded.*

State and counties by geographical sections.	Living cases of tuberculosis, 1917.			Total cases per 100,000 of total populala ion.	Living cases of tuberculosis, 1918.			Total cases per 100,000 of total populala ion.
	Total.	Males.	Females.		Total.	Males.	Females.	
Calhoun	242	104	138	390.8	267	122	145	425.9
Cass	85	39	46	415.9	93	45	48	455.6
Clinton	47	18	29	216.9	54	21	33	251.6
Eaton	57	26	31	192.3	61	29	32	206.6
Genesee	505	208	297	629.9	601	242	359	719.9
Hillsdale	76	34	42	257.3	75	32	43	254.1
Ingham	245	114	131	400.6	261	121	140	422.6
Ionia	206	100	106	624 5	216	108	108	656.4
Jackson	384	195	189	671.0	423	214	209	749.6
Kalamazoo	410	199	211	567.9	472	226	246	639.4
Kent	1,149	533	616	637,5	1,361	636	725	743.6
Lapeer	105	49	56	422.3	111	52	59	449.4
Lenawee	115	41	74	241.9	114	42	72	240.0
Livingston	102	38	64	624.6	108	42	66	669.8
Macomb	70	35	35	219.2	77	36	41	242.5
Monroe	70	26	40	211.9	76	29	47	230.0
Oakland	283	143	140	534.3	314	164	150	588.2
Ottawa	98	44	54	198.3	103	44	59	206.0
St. Clair	120	51	69	238.8	126	52	74	252.0
St. Joseph	92	46	46	344.9	96	47	49	357.7
Shiawassee	90	36	54	274.4	95	35	60	291.1
Van Buren	120	46	74	362.3	125	45	80	377.5
Wastenaw	370	223	147	870.8	381	232	149	903.2
Wayne	5,549	3,740	1,809	818.4	7,429	4,963	2,466	1,047.4

DISTRIBUTION OF THE REPORTED LIVING CASES OF TUBERCULOSIS (ALL FORMS) IN CERTAIN CITIES OF MICHIGAN HAVING AN ESTIMATED POPULATION OF 10,000 OR OVER.

In Table No. 2 is shown the number of living cases of tuberculosis, by sex, in certain cities of Michigan having 10,000 or more inhabitants, also their case rates per 100,000 estimated population.

As will be seen by the following table the prevalence of this disease, as to sex, lies with the females in the majority of the cities shown in this table. In the city of Detroit, where the reverse conditions seem to be true, the number of males, reported to this department, exceed the females by nearly 2 to 1; the reason for this is no doubt due to the fact that Detroit is such an automobile center and the employment of males is necessary.

The case rate for all cities combined per 100,000 population was 911.6 at the close of 1918. The group of cities having the greatest population experienced the highest case rate of any of the groups, which is to be expected on account of the living conditions of many of its people. The cities of the middle class or those whose estimated population ranges from 25,000 to 50,000 population enjoyed the lowest case rate.

The extremely high rate for the city of Ann Arbor can be explained in part, at least, by the fact that many persons thinking they have this disease go to this city for examination or treatment, and if they are afflicted with tuberculosis they are reported to this department as such.

Another fact that is very noticeable, in the cities of this State, whose population is increasing very rapidly, is the fact that the number of reported cases is also becoming greater each year. The increase of the reported cases in some of our cities is even greater in proportion than the increase of its population.

TABLE NO. 2—*Showing the number of cases of tuberculosis (all forms) reported to the State Board of Health, and which were still living at the close of the years 1917 axd 1918 in cities of Michigan having 10,000 inhabitants or over; also showing the case rates per 100,000 population of these cities.*

Cities.	1917.				1918.			
	Total.	Males.	Females.	Total cases per 100,00 population	Total.	Males.	Females.	Total cases per 100,000 population
TOTAL FOR CITIES	9,506	5,470	4,036	767.9	11,782	6,847	4,935	911.6
Cities over 100,00 inhabitants	6,232	3,958	2,274	865.9	8,104	5,121	2,983	1,060.5
Detroit	5,194	3,482	1,712	882 1	6,863	4,542	2,321	1,094.1
Grand Rapids	1,038	476	562	794.2	1,241	579	662	936.1
Cities from 50,000 to 100,000 inhabitants	720	298	422	693 3	860	344	516	733.3
Flint	459	178	281	799.7	552	223	329	953.3
Saginaw	261	120	141	462.3	308	121	187	537.7
Cities from 25,000 to 50,000 inhabitants	1,309	602	707	560 8	1,489	728	761	305 2
Battle Creek	124	60	64	410.6	143	71	72	462.8
Bay City	225	103	122	465.0	241	107	134	493.5
Jackson	286	138	148	794.4	350	191	159	955.7
Kalamazoo	371	186	185	736.0	431	211	220	830.3
Lansing	204	62	142	485.7	216	94	122	496.7
Muskegon	99	53	46	374.3	108	54	54	403.2
Cities from 10,000 to 25,000 inhabitants	1,245	612	633	692.3	1,329	654	675	774.5
Adrian	35	12	23	302.8	36	13	23	308.7
Alpena	68	27	41	508.2	71	27	44	526.7
Ann Arbor	281	185	96	1,868.2	294	192	102	1,950.6
Escanaba	135	61	74	840.9	134	59	75	823.0
Ironwood	35	17	18	122.5	41	20	21	276.7
Ispheming	66	30	36	556.5	69	33	36	640.2
Manistee	68	22	46	617.6	67	21	46	619.2
Marquette	96	41	55	765.2	115	52	63	906.9
Menominee	86	33	53	975.2	90	36	54	1,048.2
Pontiac	159	89	70	883.3	181	99	82	979.3
Port Huron	57	27	30	305.7	60	28	32	322.3
Sault Ste. Marie	93	43	50	658.2	99	48	51	690.4
Traverse City	66	25	41	412.0	72	26	46	501.9

GENERAL PREVALENCE OF PULMONARY AND OTHER FORMS OF TUBERCULOSIS, IN MICHIGAN, DURING EACH OF THE YEARS 1900-1918, BASED ON DEATH RATES.

Although this department had on file in this office, at the close of 1918, 18,441 living cases of tuberculosis (all forms), which is an increase of 2,859 cases over the number on file at the close of 1917. These figures cannot be taken in determining the prevalence of this disease. In comparing the prevalence of this disease for one period of years with another, that data used should be based on the deaths caused by this disease, for the reason that all deaths are reported to the State Board of Health and it is very doubtful if all cases are.

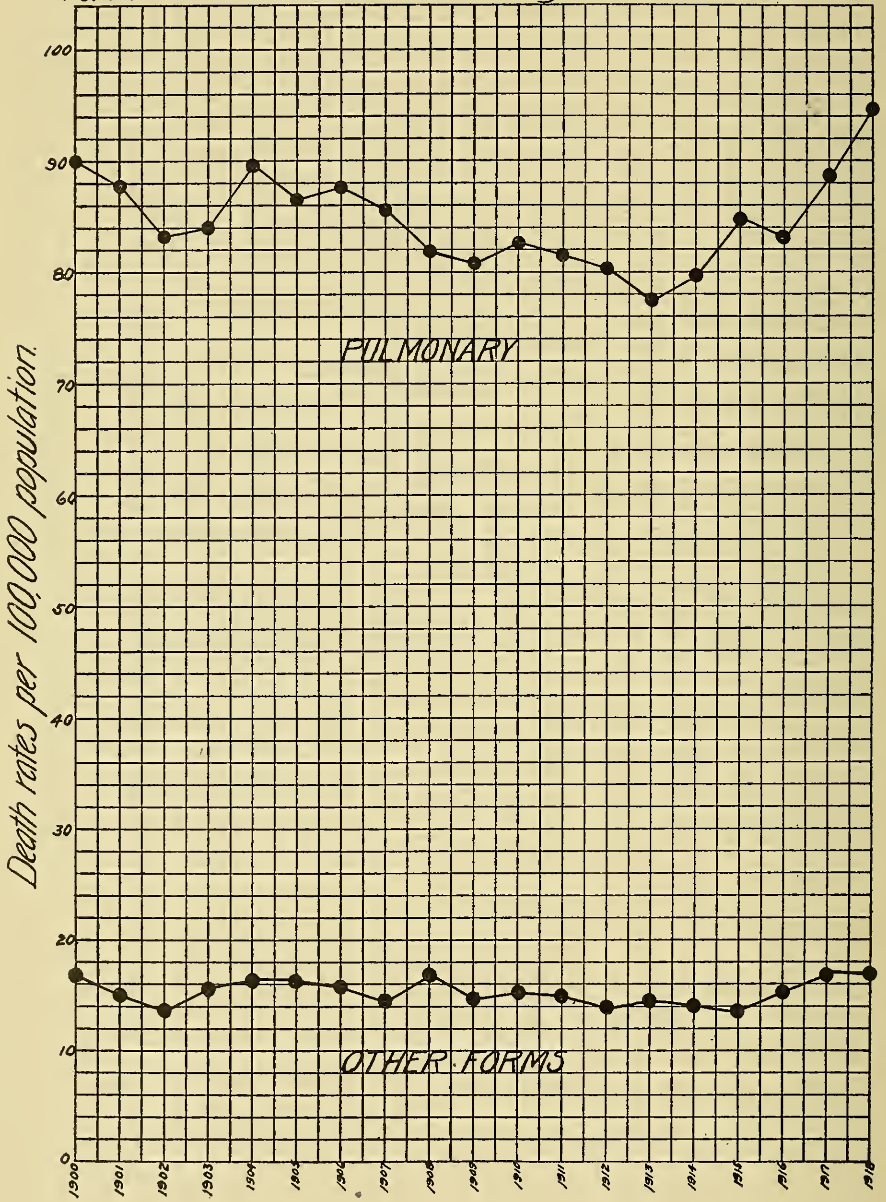
In the following table is shown the number of deaths from pulmonary and other forms of tuberculosis, together with the death rates (per 100,000 estimated population) for each of the years 1900-1918 inclusive. The data shown in this table has been divided into eight year periods, leaving the years 1916, 1917 and 1918 by themselves. The annual average death rate for the first period of years or from 1900-1907 for pulmonary and other forms of tuberculosis was 86.8 and 15.5 respectively; for the next period or for the years 1908-1915 inclusive was 81.0 and 14.6 per 100,000 estimated population. In comparing the annual averages for these two periods, while the latter is slightly less, they are practically the same. However, it is noticeable in pulmonary tuberculosis that from the year 1900 up to 1915 the death rate from this form of tuberculosis shows a very slight but steady decline; beginning with 1915 the death rate for pulmonary tuberculosis has been steadily climbing until it has reached 94.4 per 100,000 population for the year 1918. The death rate for this year was the highest recorded of any of the years since 1900, while for "Other forms of Tuberculosis" the rate for 1918 was practically as great as for any of the years since 1900.

In comparing the death rate for "All Forms of Tuberculosis" for the year 1918 with the averages for the two periods of years, the annual average rate for the years 1900-1907 was 102.3 per 100,000 estimated population while for the second period it was 95.6; this decrease is equivalent to 6.5 per cent, and for the year 1918 it was 111.0 per 100,000 population, which is an increase of 16.1 per cent over that of the annual average for the years 1908-1915.

TABLE NO. 2a.—*Showing the number of deaths from pulmonary tuberculosis and from other forms of tuberculosis; also the death rates per 100,000 population in Michigan, during the years 1900-1918 inclusive.*

Years.	Pulmonary tuberculosis.		Other forms of tuberculosis.	
	Deaths.	Deaths per 100,000 population.	Deaths.	Deaths per 100,000 population.
1900	2,183	90.0	402	16.6
1901	2,165	87.9	369	15.0
1902	2,083	83.2	346	13.8
1903	2,136	84.0	403	15.9
1904	2,309	89.4	419	16.2
1905	2,261	86.3	421	16.1
1906	2,239	87.9	421	15.8
1907	2,316	85.8	386	14.3
Annual average 1900-1907	2,223	86.8	396	15.5
1908	2,243	81.9	463	16.9
1909	2,238	80.5	402	14.5
1910	2,325	82.5	427	15.2
1911	2,330	81.5	427	14.9
1912	2,324	80.2	407	14.0
1913	2,273	77.4	420	14.3
1914	2,364	79.7	416	14.0
1915	2,556	84.8	406	13.5
Annual average 1908-1915	2,332	81.0	421	14.6
1916	2,533	83.0	464	15.2
1917	2,730	88.3	514	16.7
1918	2,955	94.4	521	16.6

Diagram Showing Prevalence of Pulmonary and "Other Forms" of Tuberculosis in Michigan 1900-1918.



DISTRIBUTION OF PULMONARY TUBERCULOSIS BY GEOGRAPHICAL SECTIONS AND IN URBAN AND RURAL DISTRICTS OF MICHIGAN.

In the following Tables 3 and 4 are shown the number of deaths and the death rates, per 100,000 estimated population, for the years 1905-1918 in the rural districts of each section of the State and in each county constituting these sections. In the above mentioned tables is also shown the total number of deaths and the death rate in the State as a whole, in the urban and rural districts of the State; the cities constituting the urban districts, as taken throughout this report, will be found in Table 5.

The death rate from pulmonary tuberculosis, for the State as a whole, for the year 1918 is the highest of any of the years shown in this table; it is 17.7 per cent higher than that of the annual average for the years 1910 to 1914. The death rate for the urban districts of the State for 1918 was 119.4 per 100,000 estimated population; the rate for this year is an increase of 31.1 per cent over the annual average rate for the years 1910 to 1914, while the death rate for the rural districts for 1918 remains practically the same as the average for the years 1910-1914.

In considering the prevalence of pulmonary tuberculosis in the rural districts of Michigan, by geographical sections, according to the data shown in Table 4, the Upper Peninsula section of the State is the part showing the slightly higher rate for the year 1918; the other three sections constituting the rest of the rural part of the State enjoyed a rate that compares very favorably with the rate for the past few years.

In Tables 5 and 6 are shown the number of deaths and the death rates for each of the cities constituting what has been termed throughout this report as the urban districts for each of the years 1905-1918. These years have been divided, as far as possible, into five-year periods and the annual average number of deaths and death rates are shown for the same. The annual average number of deaths for the years 1905-1909 were 882, which corresponds to a death rate of 94.7 per 100,000 population: for the next period of years, or from 1910-1914 the total number of deaths occurring in these cities from pulmonary tuberculosis was 1,019 or 91.1 per 100,000 population. In comparing these two periods of years a slight decrease is noted (3.8 per cent) during the second period over that of the first.

Beginning with the year 1915 the rate for all cities combined shows a steady incline until a rate of 119.4 per 100,000 estimated population is reached for the year 1918; this steady increase in the rate for these cities (urban district) compares very favorably with the gradual increase in the death rates from this disease for the State as a whole since 1915. Without giving this fact a second consideration one would be inclined to believe that the urban districts of this State were the sole cause of this gradual increase in the death rates from pulmonary tuberculosis, but there is at least one fact that should be taken into consideration, and that is, that most of the cities shown in this table (if a census would be taken) would show that they have a greater population than the estimated one used in compiling these figures; another fact that should be considered is, does this increase of the cities' population come from the rural districts of the State to any great extent or do they come from neighboring states? No doubt they come from both sources, but whether or not the rural part of this State is below the estimated population for same will remain unanswered until the next census is taken.

TABLE 3.—*Showing the total number of deaths from pulmonary tuberculosis, in Michigan, in the Urban districts (all cities having 10,000 or over inhabitants), and in the Rural districts (all cities having less than 10,000 population, and all villages and townships); also the total number of deaths occurring in the Rural districts in each of the counties of the State during the years 1905-1918.*

State and counties by geographical sections	1905	1906	1907	1908	1909	Annual average 1905–1909	1910	1911	1912	1913	1914	Annual average 1910–1914	1915	1916	1917	1918
STATE (Urban and rural districts)..................	2,261	2,329	2,316	2,243	2,238	2,277	2,325	2,330	2,324	2,273	2,364	2,323	2,556	2,533	2,730	2,955
UBBAN DISTRICTS (cities of 10,000 population and over)......	839	881	908	908	875	882	999	1,008	1,030	1,021	1,036	1,019	1,212	1,325	1,381	1,521
RURAL DISTRICTS.........	1,422	1,448	1,408	1,335	1,363	1,395	1,326	1,322	1,294	1,252	1,328	1,304	1,344	1,209	1,349	1,434
I.—Upper Peninsular Counties..................	210	258	179	208	237	218.0	190	199	227	219	259	219.0	224	237	237	291
Alger....................	4	3	3	3	3	3.2	3	4	6	4	6	4.6	5	3	3	6
Baraga....................	9	14	2	8	6	7.8	1	6	4	7	5	4.6	4	2	......	5
Chippewa..................	11	13	5	10	10	9.8	7	3	10	7	7	6.8	6	6	9	11
Delta....................	7	15	13	11	19	13.0	11	19	4	11	13	11.6	10	4	18	12
Dickinson.................	20	23	12	13	23	18.2	12	15	18	18	20	16.6	16	10	19	11
Gogebic...................	3	5	9	9	10	7.2	11	12	10	12	11	11.2	21	20	18	21
Houghton..................	81	107	68	76	91	84.6	78	70	79	73	101	80.2	73	95	87	96
Iron......................	7	11	5	15	6	8.8	5	8	6	8	16	8.6	10	10	8	21
Keweenaw..................	7	5	3	6	4	5.0	9	7	5	7	2	6.0	6	3	3	5
Luce......................	4	8	7	6	7	6.4	11	4	10	11	14	10.0	7	10	7	14
Mackinac..................	15	9	12	10	14	12.0	7	9	12	9	8	9.0	7	8	10	7
Marquette.................	18	19	20	15	21	18.6	12	23	38	32	30	27.0	37	41	33	56
Menominee.................	12	8	6	8	10	8.8	12	8	17	10	17	12.8	5	14	5	15
Ontonagon.................	8	9	6	12	8	8.6	6	3	4	1	......	2.8	8	7	9	6
Schoolcraft...............	4	9	8	6	5	6.4	5	8	4	9	9	7.0	9	4	8	5
II.—Northern Counties......	202	224	180	215	230	210.0	224	200	186	167	178	191.0	157	152	162	167
Alcona....................	5	4	3	2	7	4.2	6	1	2	4	3	3.2	2	4	......	5
Alpena....................	2	4	3	6	5	4.0	6	5	5	4	2	4.4	5	5	3	4
Antrim....................	13	14	13	7	11	11.6	6	12	6	5	11	8.0	9	8	8	13
Arenac....................	3	7	3	5	8	5.2	10	8	1	7	5	6.2	6	4	8	6
Benzie....................	11	14	13	7	13	11.6	6	10	4	6	10	7.2	5	5	12	4
Charlevoix................	11	16	12	15	17	14.2	19	15	10	16	15	15.0	12	6	11	14
Cheboygan.................	17	18	14	10	13	14.4	13	12	11	14	16	13.2	14	14	14	11
Clare.....................	2	5	7	5	7	5.2	4	3	7	3	3	4.0	5	2	5	1

Crawford	1	1	3	1	......	1.2	6	4	3	3	1	3.4	3	1	3	1
Emmet	18	13	10	21	18	16.0	15	19	21	18	13	17.2	7	11	12	12
Gladwin	5	10	6	5	2	5.8	2	5	7	3	4	4.2	4	6	5	3
Grand Traverse	6	8	9	10	9	8.4	11	10	6	6	5	7.6	3	4	1	4
Iosco	6	4	7	7	15	7.8	5	4	7	4	7	5.4	8	8	9	3
Kalkaska	10	10	3	6	11	8.0	8	4	5	2	4	4.6	6	5	2	3
Lake	1	5	5	6	5	4.4	5	2	5	3	3	3.6	3	2	3	1
Leelanau	8	11	11	17	13	12.0	16	9	5	8	10	9.6	6	10	5	11
Manistee	16	9	11	4	11	10.2	20	14	15	9	12	14.0	9	14	9	9
Mason	17	17	14	18	13	25.8	20	19	22	14	16	18.2	18	14	10	15
Missaukee	8	1	6	8	7	6.0	8	7	3	3	2	4.6	3	2	7	4
Montmorency	4	5	2	4	3	3.6	4	1	2	4	2	2.6	1	3	2	2
Ogemaw	3	7	4	8	8	6.0	2	3	3	4	2	2.8	3	1	2	6
Osceola	10	12	6	12	7	9.2	6	13	12	14	10	11.0	5	5	9	4
Oscoda	2	......	......	4	......	1.2	1	1	......	......	......	0.4	......	1	......	1
Otsego	2	3	2	6	5	3.6	2	4	3	1	2	2.4	4	1	9	6
Presque Isle	9	9	5	5	6	6.8	10	3	3	7	9	6.4	5	5	3	11
Roscommon	2	2	......	1	2	1.4	3	6	......	......	1	2.0	1	2	......	2
Wexford	10	15	8	15	14	12.4	10	6	18	5	10	9.8	10	9	10	11
III.—Central Counties	260	223	263	224	230	240.0	216	199	212	179	169	195.0	172	156	181	168
Bay	19	12	28	16	18	18.6	15	17	10	17	12	14.2	16	18	11	15
Gratiot	25	25	29	18	22	23.8	19	19	25	13	17	18.6	17	11	16	16
Huron	24	25	25	31	24	25.8	17	20	28	19	16	20.0	28	21	22	25
Isabella	19	12	20	23	22	19.2	18	12	19	11	12	14.4	6	8	15	8
Mecosta	13	14	16	17	11	14.2	13	9	16	11	8	11.4	13	9	7	5
Midland	17	10	10	5	11	10.6	14	14	10	8	10	11.2	7	9	9	8
Montcalm	14	31	27	23	20	22.8	30	13	21	21	9	18.8	14	15	14	8
Muskegon	16	6	10	8	18	11.6	9	10	5	9	13	9.2	4	11	10	7
Newaygo	17	7	12	14	11	12.2	11	13	7	10	8	9.8	5	11	9	3
Oceana	15	10	14	13	16	13.6	11	8	13	9	11	10.4	12	6	16	10
Saginaw	20	14	20	21	16	18.2	21	24	23	21	17	21.2	18	11	19	25
Sanilac	36	24	33	14	17	24.8	18	16	15	10	19	15.6	12	11	14	15
Tuscola	25	33	19	21	24	24.4	20	24	20	20	17	20.2	20	15	19	23
IV.—Southern Counties	750	743	786	688	666	727.0	696	724	669	687	722	700.0	791	664	769	808
Allegan	32	27	29	20	28	27.2	40	30	20	28	19	27.4	24	12	22	25
Barry	18	13	21	9	13	14.8	5	10	12	10	3	8.0	8	11	10	10
Berrien	33	48	47	45	47	44.0	43	46	47	34	37	41.2	48	33	41	43
Branch	17	21	18	17	15	17.6	16	16	16	11	16	15.0	11	11	8	9
Calhoun	28	25	23	12	19	21.4	15	15	22	21	15	17.6	27	18	22	20
Cass	18	24	15	19	17	18.6	18	13	14	11	13	13.8	18	16	11	15
Clinton	20	20	24	11	11	17.2	8	17	10	10	7	10.4	5	7	17	11
Eaton	27	37	27	28	25	28.8	32	18	13	12	13	17.6	8	12	19	10
Genesee	23	18	16	20	15	18.4	12	13	15	17	12	13.8	16	19	20	18
Hillsdale	22	25	23	25	17	22.4	20	18	11	13	17	15.8	24	14	12	21
Ingham	15	16	12	14	12	13.8	14	14	4	10	12	10.8	11	7	11	14
Ionia	34	33	26	20	29	28.4	17	27	27	17	20	21.6	17	25	20	12
Jackson	16	9	12	14	10	12.2	7	16	8	10	7	9.6	15	10	16	11
Kalamazoo	15	12	13	11	10	12.2	14	18	9	10	7	11.6	8	7	7	16
Kent	40	41	45	60	41	45.4	48	55	50	62	63	55.6	45	46	41	60
Lapeer	17	15	20	21	17	18.0	20	10	19	21	19	17.8	24	19	18	18
Lenawee	23	32	34	22	27	27.6	19	24	22	13	23	20.2	27	13	20	20

TABLE 3.—*Continued.*

State and counties by geographical sections	1905	1906	1907	1908	1909	Annual average 1905–1909	1910	1911	1912	1913	1914	Annual average 1910–1914	1915	1916	1917	1918
Livingston	13	11	18	15	13	14.0	15	15	32	22	19	20.6	17	13	17	18
Macomb	23	25	28	32	25	26.6	35	24	17	18	21	23.0	27	15	18	16
Monroe	34	28	30	27	17	26.2	26	30	20	21	19	23.2	16	24	14	21
Oakland	24	27	23	28	23	25.0	11	26	15	18	14	16.8	24	11	23	20
Ottawa	38	33	37	40	23	34.2	30	42	35	31	19	31.4	27	36	21	33
St. Clair	26	14	40	33	20	26.6	32	16	27	22	16	22.6	18	13	17	12
St. Joseph	24	14	19	15	18	18.0	18	14	12	13	12	13.8	12	19	15	20
Shiawassee	31	34	31	19	24	27.8	25	16	12	17	16	17.2	15	19	17	24
Van Buren	21	27	30	21	22	24.2	19	24	16	12	34	21.0	13	15	21	18
Washtenaw	30	20	36	13	28	25.4	22	20	12	21	14	17.8	16	11	21	18
Wayne	88	94	89	77	100	89.6	115	137	152	182	235	164.2	270	208	270	275

TABLE 4.—*Showing the death rates per 100,000 population from pulmonary tuberculosis for the State of Michigan, for the Urban district (cities of 10,000 inhabitants and over), and for the Rural districts (cities of less than 10,000 inhabitants, and all villages and townships); also the death rates from this disease for the Rural districts in each county, during the years 1905-1918.*

State and counties by geographical sections.	1905	1906	1907	1908	1909	Annual average 1905-1909.	1910	1911	1912	1913	1914	Annual average 1910-1914.	1915	1916	1917	1918
STATE (Urban and rural localities)............	86.3	87.9	85.8	81.9	80.5	84.9	82.5	81.5	80.2	77.4	79.7	80.2	84.8	83.0	88.3	94.4
URBAN DISTRICTS (cities of 10,000 inhabitants and over).......	94.7	96.1	95.9	92.8	86.7	94.7	96.1	94.2	93.5	90.2	89.1	91.1	101.6	108.9	110.7	119.4
RURAL DISTRICTS....	81.9	83.0	80.3	75.8	77.0	79.6	74.5	74.0	72.0	69.4	73.2	74.8	73.8	65.8	74.5	77.3
I.—Upper Peninsula Counties..........	93.4	111.8	75.7	85.8	95.6	92.2	74.9	76.8	86.3	80.8	93.6	82.6	79.2	82.1	80.5	96.4
Alger................	58.8	43.0	41.9	40.8	39.8	44.7	38.9	50.7	74.3	48.4	71.0	56.9	58.0	34.0	33.7	65.7
Baraga.......... ...	171.4	257.7	35.6	138.0	100.3	138.9	16.2	94.5	61.2	104.3	72.5	70.4	56.5	27.5	......	65.5
Chippewa............	97.0	113.5	43.3	85.7	84.9	84.8	59.0	25.0	82.7	57.4	56.9	56.2	48.3	47.9	72.4	86.4
Delta................	44.7	94.2	80.3	66.9	113.7	80.3	64.8	110.3	22.9	62.0	72.2	66.3	54.7	21.2	84.9	64.0
Dickinson...........	103.9	117.9	60.7	64.9	113.2	92.0	58.3	72.0	85.3	84.2	92.4	78.6	73.0	44.9	83.9	47.8
Gogebic.............	34.0	54.5	94.5	91.1	97.8	75.6	103.9	109.7	88.6	103.1	91.7	99.2	170.1	155.0	133.8	149.8
Houghton...........	104.6	134.4	83.1	90.4	105.4	103.3	88.1	77.1	84.9	76.6	103.6	86.2	73.2	93.2	83.5	90.1
Iron.................	57.5	86.0	37.3	106.8	40.9	65.6	32.7	50.3	36.3	46.6	89.9	52.0	54.3	52.5	40.7	103.5
Keweenaw..........	133.5	88.6	49.7	93.2	58.5	82.7	124.3	91.7	62.2	83.0	22.6	74.7	65.0	31.1	30.0	48.4
Luce.................	114.0	221.5	188.4	157.1	178.5	172.3	273.2	96.9	236.3	253.7	315.4	236.3	154.1	215.3	147.5	288.7
Mackinac...........	176.5	104.0	136.2	111.5	153.4	136.4	75.4	95.4	125.1	92.3	80.7	93.8	69.5	78.3	96.4	66.5
Marquette..........	88.1	90.8	93.4	68.5	93.8	86.9	52.4	98.4	159.2	131.3	120.7	113.0	145.9	158.8	125.5	201.6
Menominee.........	81.6	54.1	40.3	53.4	66.4	59.1	79.2	52.5	110.8	64.8	109.5	83.4	32.0	99.1	31.5	93.8
Ontonagon..........	107.2	116.8	75.4	146.3	94.6	108.1	68.9	33.5	43.5	10.6	......	30.4	80.5	68.7	86.2	56.1
Schoolcraft..........	48.2	107.4	94.6	70.3	58.0	75.7	57.5	91.1	45.2	100.7	99.8	79.0	98.9	43.6	86.3	53.4
II.—Northern Counties.	73.0	80.1	63.6	75.2	79.6	74.3	76.7	67.8	62.4	55.5	58.5	64.1	51.1	49.0	51.6	52.5
Alcona..............	87.8	70.2	52.6	35.1	122.8	73.7	105.2	17.5	35.1	70.1	52.6	56.1	35.0	70.0	......	87.5
Alpena..............	29.1	57.6	42.7	84.4	69.5	56.9	82.5	68.0	67.2	53.2	26.3	59.1	65.1	64.3	34.0	50.6
Antrim..............	80.7	87.3	81.6	44.2	69.8	72.7	38.3	77.0	38.7	32.5	71.8	51.6	59.1	52.8	53.2	86.9
Arenac..............	30.8	72.1	31.0	51.7	82.9	53.7	103.8	83.2	10.4	73.1	52.3	64.6	62.9	43.0	81.6	60.7
Benzie..............	108.1	136.3	125.4	66.9	123.1	111.9	56.3	93.0	36.9	54.8	90.6	66.4	44.9	44.5	105.9	35.0
Charlevoix..........	66.1	93.2	67.9	92.4	90.7	80.3	98.6	75.8	49.2	76.7	70.2	73.8	54.8	26.8	48.0	59.8
Cheboygan..........	101.6	106.1	81.4	57.3	73.5	83.7	72.5	66.1	59.8	75.1	84.8	71.8	73.2	72.2	71.3	55.4
Clare...............	22.7	56.2	77.9	55.1	76.3	57.8	43.2	32.1	74.2	31.5	31.2	42.4	51.5	20.4	50.6	10.0
Crawford...........	29.0	28.1	82.1	26.6	......	32.9	151.7	98.6	72.2	70.5	23.0	81.8	67.3	21.9	64.4	21.0
Emmet..............	104.1	74.1	56.1	116.1	98.1	89.8	80.6	100.6	109.7	92.7	66.1	89.8	35.1	54.4	58.6	57.8

TABLE 4—*Continued.*

Cities.	1905	1906	1907	1908	1909	Annual Average 1905-1909	1910	1911	1912	1913	1914	Annual Average 1910-1914	1915	1916	1917	1918
Gladwin	66.5	129.8	76.0	61.9	24.2	73.5	23.7	57.9	79.3	33.3	43.5	47.6	42.6	62.6	51.2	30.1
Grand Traverse	52.7	69.9	78.3	86.5	77.4	73.0	94.2	85.2	50.8	50.6	41.9	64.4	25.0	33.2	8.2	32.8
Iosco	60.0	40.2	70.8	71.1	153.2	78.9	51.3	41.3	72.6	41.7	73.4	56.0	84.3	84.6	95.6	32.0
Kalkaska	131.1	129.4	38.3	75.7	137.2	102.2	98.6	48.7	60.2	23.8	47.0	55.3	69.7	57.5	22.7	33.7
Lake	20.2	101.1	101.1	121.4	101.2	89.0	101.2	40.5	101.3	60.8	60.8	72.9	60.8	40.6	60.9	20.3
Leelanau	75.6	103.9	103.8	160.4	122.6	113.3	150.8	84.8	47.1	75.3	94.1	90.4	56.4	94.0	47.0	103.3
Manistee	114.6	64.1	78.0	28.2	77.2	72.3	139.6	97.3	103.7	61.9	82.1	96.8	61.3	94.5	60.4	60.1
Mason	83.3	82.1	66.7	84.5	60.2	75.2	91.3	85.6	97.8	61.4	69.3	80.7	77.0	59.1	41.7	61.8
Missaukee	80.2	9.9	58.6	77.1	66.7	58.6	75.2	65.0	27.5	27.2	17.9	42.2	26.6	17.5	60.6	34.2
Montmorency	114.2	140.7	55.4	109.3	80.8	99.8	106.2	26.2	51.7	101.9	50.3	67.0	24.8	73.5	48.4	47.8
Ogemaw	35.9	82.7	46.6	92.0	90.8	69.9	22.4	33.2	32.7	43.1	21.3	30.6	31.5	10.4	20.5	60.9
Osceola	55.9	67.1	33.6	67.1	39.1	51.5	33.5	72.7	67.1	78.2	55.9	61.5	27.9	27.9	50.2	22.3
Oscoda	113.9	......	......	207.8	......	64.2	49.0	47.7	......	......	......	18.6	......	42.0	......	40.1
Otsego	31.4	46.8	31.0	92.5	76.7	55.9	30.5	60.6	45.2	15.0	29.8	36.3	59.3	14.7	131.9	87.4
Presque Isle	89.4	87.2	47.3	46.3	54.3	64.4	88.5	26.0	25.4	58.2	73.3	54.4	39.9	39.1	23.0	82.9
Roscommon	98.2	95.9	......	45.8	89.5	65.5	131.3	257.2	......	......	40.3	84.0	39.5	77.5	......	74.6
Wexford	53.0	77.9	40.7	74.8	68.4	63.1	48.0	28.2	83.2	22.7	44.6	45.3	43.8	38.7	42.3	45.7
III.—Central Counties	**77.2**	**66.2**	**78.1**	**66.5**	**68.3**	**71.2**	**64.1**	**59.1**	**62.9**	**53.1**	**50.1**	**57.9**	**51.0**	**46.2**	**53.7**	**49.8**
Bay	84.9	53.3	123.5	70.1	78.4	81.2	64.9	73.1	42.7	72.2	50.7	60.7	67.1	79.2	45.6	61.8
Gratiot	85.2	85.5	99.6	62.0	76.1	81.7	66.0	66.2	87.5	45.7	59.9	65.1	60.2	39.1	57.1	57.3
Huron	69.6	72.4	72.3	89.5	69.2	68.8	48.9	57.4	80.2	54.4	45.7	57.3	79.8	59.8	60.2	70.9
Isabella	82.9	52.3	87.1	100.0	95.6	83.6	78.1	52.0	82.3	47.6	51.9	64.2	25.9	34.5	64.6	34.4
Mecosta	64.8	70.2	80.8	86.3	56.2	71.7	66.9	46.6	83.4	57.7	42.2	59.4	69.1	48.3	37.7	27.1
Midland	119.6	70.6	70.8	35.5	78.4	75.0	100.0	100.3	71.9	57.7	72.4	80.5	50.8	65.5	65.7	58.7
Montcalm	43.2	95.9	83.7	71.4	62.3	73.8	93.6	40.6	65.8	65.9	28.3	58.9	44.2	47.4	44.3	25.4
Muskegon	97.7	36.6	60.9	48.6	109.2	70.6	54.5	60.4	30.2	54.2	78.1	55.5	24.0	65.9	59.8	41.8
Newaygo	92.0	37.6	63.9	73.9	57.6	65.0	57.1	67.0	35.8	50.7	40.2	50.1	25.0	54.5	44.2	14.6
Oceana	85.5	56.5	78.3	72.0	87.7	76.0	59.7	43.0	69.3	47.5	57.5	55.4	62.2	30.7	81.0	50.0
Saginaw	51.5	36.1	51.5	54.1	41.3	46.9	54.2	61.9	59.3	54.2	43.9	54.7	46.5	28.4	49.1	64.6
Sanilac	104.4	69.8	96.4	41.0	50.0	72.4	53.1	47.3	44.5	29.8	56.8	46.3	36.0	33.1	42.1	45.5
Tuscola	70.6	93.5	54.0	59.8	68.6	69.3	57.3	69.0	57.6	57.8	49.3	58.2	58.1	43.7	55.6	67.4
IV.—Southern Counties	**83.6**	**82.8**	**87.7**	**76.7**	**74.3**	**81.1**	**77.7**	**80.8**	**76.6**	**76.7**	**80.7**	**78.2**	**88.4**	**74.0**	**89.6**	**89.8**
Allegan	81.4	68.5	73.4	50.5	70.5	68.8	100.0	75.1	49.9	69.7	47.2	68.5	59.5	29.6	54.3	61.5
Barry	79.7	57.6	92.9	39.8	57.5	66.5	22.1	44.2	53.0	44.1	13.2	35.3	35.3	48.5	43.6	44.0
Berrien	64.1	92.5	89.8	85.2	88.2	84.0	80.1	84.9	86.1	61.8	66.6	75.4	85.8	58.5	72.8	76.0
Branch	63.7	79.4	68.6	65.4	58.2	67.1	62.6	63.2	63.7	44.2	64.9	59.7	45.0	45.4	33.3	37.9
Calhoun	90.1	80.3	73.7	38.4	60.7	68.6	47.8	47.7	69.8	66.5	74.4	55.9	85.2	56.7	69.4	66.4
Cass	86.8	115.8	72.5	91.9	82.3	89.9	87.3	63.1	68.1	53.5	63.4	67.1	87.8	78.2	53.8	73.5
Clinton	83.0	83.7	101.3	46.8	47.2	72.6	34.7	74.3	44.1	44.5	31.4	45.9	22.7	32.0	78.5	51.3
Eaton	86.9	119.6	87.6	91.2	81.7	93.5	105.0	59.3	43.0	39.8	43.3	58.2	26.8	37.0	64.1	33.9
Genesee	84.2	66.6	59.8	75.5	57.2	68.7	46.2	50.6	59.1	67.7	48.3	54.3	65.1	78.8	87.8	76.7
Hillsdale	73.9	84.0	77.4	84.2	57.3	75.4	67.4	60.7	37.1	43.9	57.4	53.3	81.2	47.4	40.6	71.2
Ingham	66.1	70.9	53.5	62.8	54.1	61.5	63.5	63.8	18.3	46.1	55.7	49.6	51.4	34.5	57.4	77.6

Ionia	100.2	97.5	77.0	59.4	86.3	**84.1**	50.7	80.7	80.9	51.1	60.2	**64.7**	51.3	75.6	60.6	36.8
Jackson	71.1	40.2	53.8	63.1	45.3	**54.7**	31.9	73.2	36.8	46.2	32.5	**44.1**	70.0	46.9	75.3	52.0
Kalamazoo	73.3	58.3	62.9	52.9	47.8	**59.0**	66.7	85.2	42.4	46.9	32.6	**54.6**	37.1	32.3	32.1	73.0
Kent	90.0	91.4	99.3	131.1	88.7	**100.2**	102.9	116.7	105.1	129.1	130.0	**116.9**	92.0	93.5	83.0	120.8
Lapeer	63.4	56.3	75.5	79.8	65.0	**68.0**	76.9	38.7	74.0	82.3	75.0	**69.3**	95.3	75.9	72.4	72.9
Lenawee	60.6	84.7	90.4	58.8	72.4	**100.0**	51.2	65.0	59.8	35.5	63.1	**54.9**	74.4	36.0	55.6	55.8
Livingston	69.6	59.5	98.5	82 9	72.7	**76.6**	84.8	85.7	184.9	128.6	112.3	**113.3**	101.7	78.7	104.1	111.6
Macomb	69.9	76.1	85.4	97.8	76.6	**81.1**	107.4	73.8	52.4	55.6	64.9	**70.1**	83.7	46.7	56.4	50.4
Monroe	103.5	85.2	91.3	82.1	51.7	**79.7**	79.0	91.1	60.7	63.7	57.6	**70.4**	48.5	72.7	42.4	63.5
Oakland	68.5	77.1	65.6	79.9	65.6	**71.4**	31.4	74.2	42.8	51.4	39.9	**47.9**	68.5	31.4	65.8	57.3
Ottawa	89.3	76.5	84.7	90.3	51.3	**78.2**	66.1	91.3	75.2	65.8	39.8	**67.4**	55.9	73.7	42.5	66.0
St. Clair	74.9	40.6	116.9	97.2	59.4	**77.8**	95.7	48.3	82.1	67.4	49.4	**68.7**	56.1	40.8	53.8	38.3
St. Joseph	97.1	56.3	75.9	59.5	70.9	**71.9**	70.5	54.5	46.4	50.0	45.8	**53.4**	45.5	71.7	56.2	74.5
Shiawassee	92.4	101.5	92.8	57.0	72.1	**83.2**	75.2	48.2	36.2	51.4	48.5	**52.0**	45.6	57.8	51.8	74.2
Van Buren	63.2	81.3	90.3	63.2	66.3	**72.9**	57.3	72.3	48.2	36.2	102.6	**63.3**	39.2	48.3	63.4	54.4
Washtenaw	95.2	64.1	116.7	42.6	92.8	**82.4**	73.8	67.8	41.2	72.9	49.2	**61.1**	56.9	39.7	76.5	66.4
Wayne	136.4	145.1	136.8	117.9	152.4	**136.2**	174.6	207.1	228.8	272.8	350.8	**247.2**	401.4	308.2	350.8	348.3

TABLE 5.—*Showing the number of deaths from pulmonary tuberculosis in each of the cities of Michigan having 10,000 or more inhabitants during each of the years 1905 to 1918 inclusive. Also showing the average number of deaths from this disease for the two five-year periods, 1905-1909 and 1910-1914.*

Cities.	1905	1906	1907	1908	1909	Annual Average 1905-1909	1910	1911	1912	1913	1914	Annual Average 1910-1914	1915	1916	1917	1918
ALL CITIES	**839**	**881**	**908**	**908**	**875**	**882**	**999**	**1,008**	**1,030**	**1,021**	**1,036**	**1,019**	**1,212**	**1,325**	**1,381**	**1,521**
Adrian	4	4	8	10	11	7	8	6	8	5	7	7	6	6	6	12
Alpena	10	9	6	16	15	11	8	16	16	7	8	11	9	4	10	7
Ann Arbor	21	19	21	14	15	18	19	17	10	14	16	15	23	24	29	17
Battle Creek	34	21	19	24	17	23	17	19	21	17	23	19	28	17	18	20
Bay City	40	34	21	35	23	31	27	37	41	43	32	36	29	53	31	41
Detroit	347	409	397	391	387	386	465	487	500	513	557	504	658	820	817	930
Escanaba	23	18	17	15	12	17	11	11	9	16	13	12	12	15	17	18
Flint	16	18	17	10	18	16	40	23	29	29	26	29	23	32	28	31
Grand Rapids	74	84	98	82	95	87	115	101	91	66	84	91	107	66	102	115
Ironwood	8	2	8	13	11	8	14	8	7	8	11	10	12	14	22	6
Ispheming	19	8	18	11	10	13	12	5	10	6	7	8	7	4	6	6
Jackson	35	27	28	29	24	29	24	28	22	29	28	26	33	25	33	42
Kalamazoo	38	45	48	36	45	40	46	47	49	67	46	51	61	52	57	65
Lansing	13	13	13	20	14	15	19	18	29	21	13	20	15	15	23	15
Manistee	20	17	20	18	9	17	9	17	11	15	14	13	18	18	10	15
Marquette	19	12	15	14	14	15	16	16	10	7	8	11	10	17	9	6
Menominee	8	8	5	10	10	8	6	6	8	8	13	8	11	7	9	12
Muskegon	16	26	24	29	23	24	20	29	26	23	24	24	32	27	36	24
Pontiac	8	17	13	30	24	18	26	15	25	25	14	21	24	15	21	42
Port Huron	11	15	15	15	12	14	13	18	15	14	17	15	13	14	16	13
Saginaw	37	35	37	45	52	41	43	43	54	37	38	43	32	43	47	42
Sault Ste. Marie	13	14	17	10	12	13	4	20	12	16	8	12	9	6	9	9
Traverse City	25	26	33	31	22	27	37	21	27	35	29	30	40	31	25	33

TABLE 6.—*Showing the death rates per 100,000 population from pulmonary tuberculosis in each of the cities of Michigan having 10,000 or more inhabitants, during each of the years 1905 to 1918 inclusive. Also showing the average death rate from this disease for the two five-year periods, 1905-1909 and 1910-1914.*

Cities	1905	1906	1807	1908	1909	Annual Average 1909-1909	1910	1911	1912	1913	1914	Annual Average 1910-1914	1915	1916	1917	1918
ALL CITIES	**94.7**	**96.1**	**95.9**	**92.8**	**86.7**	**94.7**	**96.1**	**94.2**	**93.5**	**90.2**	**89.1**	**91.1**	**101.6**	**109.8**	**110.7**	**119.4**
Adrian	39.1	38.7	76.7	94.7	103.1	65.2	74.2	55.1	72.7	45.0	62.3	63.8	52.9	52.4	51.9	102.9
Alpena	81.5	72.8	48.6	127.6	118.7	88.5	62.9	124.8	124.0	53.9	61.1	85.3	68.3	30.1	74.7	51.9
Ann Arbor	143.2	129.3	142.6	94.8	101.4	122.5	128.2	114.4	67.2	93.8	107.0	100.8	153.5	159.2	192.8	112.8
Battle Creek	154.5	92.5	81.3	99.8	68.7	96.6	66.9	72.8	78.5	61.9	81.8	71.2	97.2	57.6	59.6	64.7
Bay City	93.0	78.2	70.6	78.9	51.3	72.1	59.7	81.0	88.8	92.3	68.0	77.9	61.1	110.6	64.1	84.0
Detroit	91.7	103.2	95.7	90.3	85.8	96.2	99.1	99.9	98.9	97.9	102.7	100.0	117.4	143.4	138.7	153.6
Escanaba	201.3	152.6	139.8	119.7	93.0	139.4	82.9	80.6	64.2	111.3	88.2	85.8	79.4	96.5	105.9	108.9
Flint	61.1	62.5	54.2	29.5	49.3	58.6	102.3	55.2	65.5	61.9	52.6	65.1	44.2	58.4	48.8	51.7
Grand Rapids	73.7	81.6	92.9	75.9	85.9	83.2	101.7	87.3	77.0	54.7	68.2	77.0	85.1	51.4	78.0	86.2
Ironwood	70.0	17.2	67.0	106.1	87.5	69.6	108.6	60.6	51.8	57.8	77.7	73.8	83.0	96.0	149.7	41.8
Ispheming	147.9	62.7	141.9	87.2	79.8	107.8	96.4	40.4	81.4	49.1	57.7	64.7	58.1	33.4	50.6	55.7
Jackson	123.2	93.0	94.4	95.7	77.6	101.7	76.0	87.0	67.0	86.7	82.1	79.1	95.0	70.7	91.1	14.7
Kalamazoo	118.2	133.7	136.4	98.1	117.7	114.8	115.7	113.9	114.5	151.2	100.3	119.3	128.8	106.4	113.1	125.2
Lansing	54.0	50.8	48.0	70.0	46.6	57.6	60.2	54.5	84.0	58.3	34.7	57.8	38.5	37.4	54.8	34.5
Manistee	150.2	129.5	154.6	141.1	71.6	135.6	72.7	139.4	91.6	126.9	120.3	108.3	157.2	160.7	90.8	138.6
Marquette	175.9	109.6	135.2	124.6	123.0	135.1	138.7	137.0	84.6	58.5	66.0	93.0	81.5	137.0	71.7	47.3
Menominee	68.7	70.0	44.7	91.2	93.1	74.1	57.1	58.4	79.6	81.5	135.6	80.0	117.5	77.3	102.0	139.8
Muskegon	71.2	114.0	103.7	123.5	96.6	106.4	82.9	118.6	104.9	91.6	94.3	96.7	124.2	103.4	136.1	89.6
Pontiac	65.5	133.8	98.6	219.5	169.6	138.1	177.7	99.2	160.3	155.5	84.5	134.7	140.8	85.6	116.7	227.2
Port Huron	57.9	79.0	79.2	79.3	63.5	72.1	68.9	95.6	79.8	74.6	90.7	80.0	69.5	75.0	85.8	69.8
Saginaw	79.5	73.9	76.8	91.8	104.3	84.3	84.8	83.5	103.2	69.6	70.4	82.3	58.4	75.7	83.2	73.3
Sault Ste. Marie	112.0	118.5	141.3	81.7	96.4	107.8	31.6	155.4	91.8	120.4	59.3	91.8	65.6	43.1	63.7	62.8
Traverse City	231.5	234.8	290.8	266.7	184.9	230.8	304.0	168.7	212.3	269.4	218.6	236.6	295.4	224.5	177.6	230.0

AGE AND SEX DISTRIBUTION OF THE LIVING CASES OF TUBERCULOSIS (ALL FORMS) IN MICHIGAN, AS REPORTED TO THIS DEPARTMENT AND ON RECORD IN THIS OFFICE AT THE CLOSE OF THE YEAR 1918, ALSO THE RELATIVE SUSCEPTIBILITY TO THIS DISEASE AS BETWEEN THE SEXES OF ALL AGES, BETWEEN THE SEXES AT VARIOUS AGE GROUPS AND AS BETWEEN THE AGES OF THOSE OF THE SAME SEX.

In Table 7 is shown the age and sex distribution of the 18,441 living cases of tuberculosis in Michigan, reported to and on record in this office at the close of the year 1918. Of the 18,441 living cases 9,975, or 54.1 per cent, are males and 8,466, or 45.9 per cent are females. The per cent, by sex, is shown for the cases reported at each age group to the total number of cases for each sex. The cases per 100,000 population of corresponding ages and sex are also given.

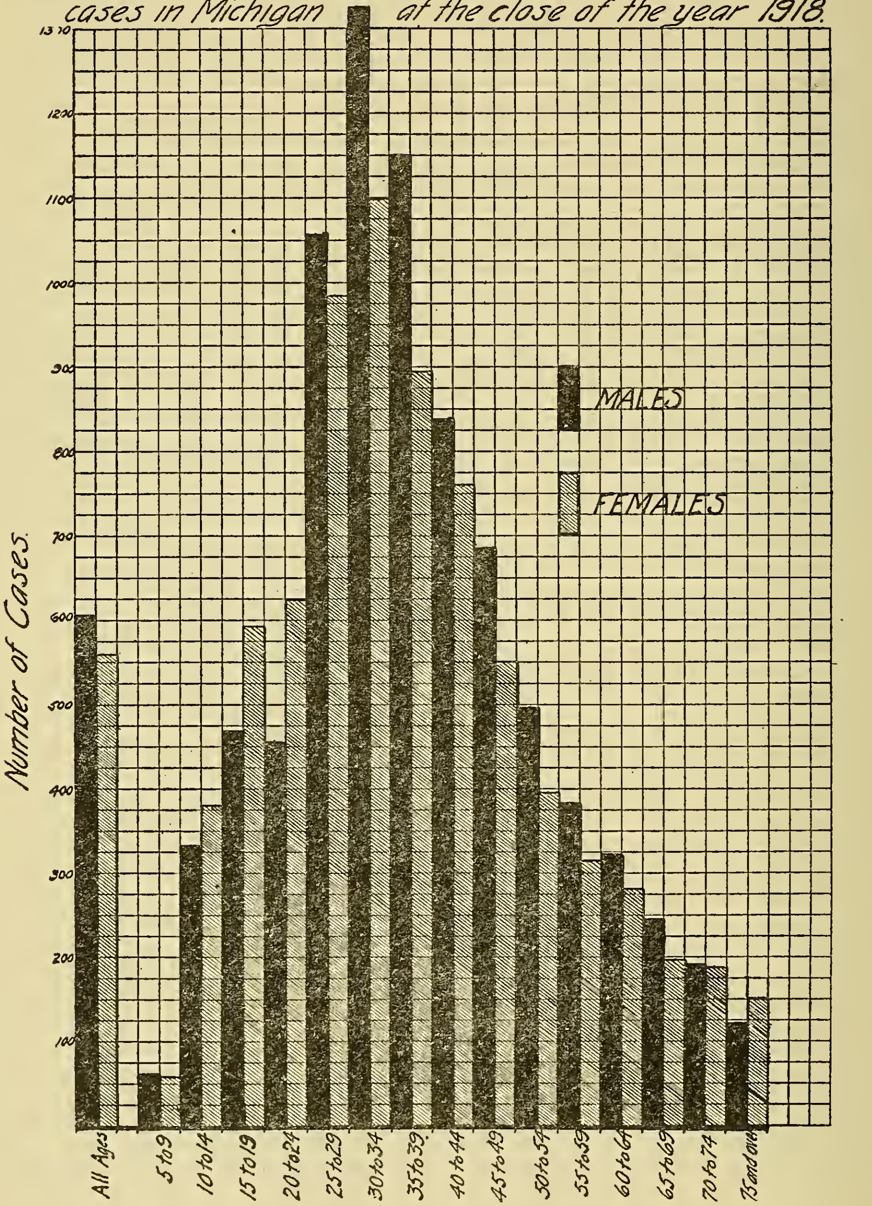
Of the 18,441 reported living cases of tuberculosis, according to the data shown in the following table, 8,880, or 48.2 per cent of all the cases that we have on record in this office, are between the ages of 20 and 34 years. Considering these cases by sex the males exceed the number of females by approximately 30 per cent, the number of males being 5,026 and females 3,854, while in the age group (15-19 years) the number of females exceeds the number of males by 28 per cent, and in the age group of from 35 to 39 years the males again exceed the number of females by 21 per cent. In each of the age groups between the years 40 to 70 years and over the prevalency of this disease seems to lie with the males.

Based on the above mentioned cases, the males at all ages seem to experience a greater susceptibility to this disease than do the females, their attack rates being 603.6 and 557.8 per 100,000 of their estimated population, respectively. This same condition seems to exist for those of the first age group, or under 5 years. For the age groups 5-9, 10-4 and 15-19 years, it will be noticed that the females exceed those of the males per 100,000 of their respective populations. During the age groups, 5-19 years are what is termed the school ages and there is no reason to believe that one sex is subject to exposure to this disease any more than the other, or in other words, the conditions surrounding the males and females between the ages of 5 to 19 years are the same. Furthermore, we have no reason to believe that the parents of the State would fail to have examined or the physicians neglect to report one sex more than the other. After considering the last mentioned facts it would lead us to believe that, where the conditions are the same the females are more susceptible to this disease than is the male. During the ages 20 to 34, inclusive, the prevalency of this disease lies with the males, but this should be expected because the males, whose ages range from 20 to 34 years, are employed in places in which the working conditions are more favorable to this disease than are the occupations followed by the females of this age. It is during this period that the greatest prevalency of this disease is shown in both sexes, and with each later age group the susceptibility to this disease seems to diminish as the later years of life are reached.

TABLE No. 7.—*Showing age and sex distribution of cases of tuberculosis (all forms) reported to the State Board of Health, which were still living at the close of the year 1918, as indicated by the per cent of cases at each age group and of each sex of the total cases of all ages and of both sexes, also the number of cases per 100,000 population of Michigan of corresponding ages and sex in 1918.*

	Living cases.			Per cent of total cases.			Cases per 100,000 population of corresponding age and sex.		
Age groups.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.
ALL AGES....	**18,441**	**9,975**	**8,466**	**100.0**	**100.0**	**100.0**	**580.6**	**603.6**	**557.8**
Under 5 years..	204	106	98	1.1	1.1	1.2	61.8	63.4	60.2
5 –9 years....	1,006	477	529	5.5	4.8	6.2	353.3	331.1	376.0
10–14 years....	1,415	635	780	7.7	6.4	9.9	528.9	468.0	590.9
15–19 years....	1,580	694	886	8.6	7.0	10.5	535.9	459.6	624.6
20–24 years....	3,073	1,654	1,419	16.7	16.6	16.8	1,024.3	1,058.5	981.2
25–29 years....	3,367	1,944	1.423	18.3	19.5	16.8	1,222.9	1,333.3	1,098.6
30–34 years....	2,440	1,428	1,012	13.2	14.3	12.0	1,025.2	1,149.5	889.6
35–39 years....	1,697	929	768	9.2	9.3	9.1	796.4	836.6	766.8
40–44 years....	1,142	668	474	6.2	6.7	5.6	621.2	684.9	550.2
45–49 years....	791	458	333	4.3	4.6	3.9	449.8	498.0	398.2
50–54 years....	573	333	240	3.1	3.3	2.8	354.2	386.3	317.8
55–59 years....	357	208	149	1.9	2.1	1.8	303.0	323.4	278.5
60–64 years....	218	127	91	1.2	1.3	1.1	224.2	246.2	199.3
65–69 years....	150	80	70	.8	.8	.8	188.5	192.5	189.5
70 yrs. and over	144	73	71	.8	.8	.8	134.7	124.7	147.1
Years not stated	294	161	133	1.5	1.6	1.5	....	....	......

Tuberculosis - Susceptibility as between the sexes, and the ages of those of the same sex, based on the 18,441 living cases in Michigan at the close of the year 1918.



AGE DISTRIBUTION OF THE TOTAL NUMBER OF DEATHS FROM PULMONARY TUBERCULOSIS, IN MICHIGAN, DURING EACH OF THE YEARS 1905-1918.

In Table 8 is shown the number of fatal cases of pulmonary tuberculosis during each of the years 1905 to 1918, inclusive. The deaths by ages is also shown for the above mentioned years. In Table 9 is shown the death rates per 100,000 estimated population, at the various age groups to the population of corresponding years.

As indicated by the data shown in Table 9 the minimum death rate from pulmonary tuberculosis during the years 1905-1909 was recorded at the age group 5-9 years, while the maximum rate was reached at the ages of 20-29 years, the average rates being 7.3 and 150.7 per 100,000 population of corresponding age, respectively. During the second period of years, 1910-1914, the minimum and maximum rates were reached at the same age groups as the previous five-year period, the annual average rates being 6.5 and 141.8, respectively. It will be noted that while the annual average rates for these two periods are very much the same, a slight decrease is noted in the later rate over that of the former.

In comparing the death rates for the years 1915 and 1916 with the annual average rate for the years 1910-1914, for the age groups 5-9 and 20-29 years, we find that for the year 1915 they compare very favorably, while the rate for this year for all ages combined is slightly higher than that of the annual average rate for the years of the second period. For the year 1916 the rate for all ages continues to show a slight increase over the rate for the years 1910-1914. However, it is a trifle lower than the rate for the previous year, as for the ages of 5-9 years the rate for 1916 is practically twice that for the year 1915, and the annual average for 1910-1914. For the age group 20-29 years the rate for this year, while slightly higher, compares favorably with that of the previous year, and also with that for the years 1910-1914.

For the years 1917 and 1918 the death rates, per 100,000 estimated population, for all ages combined continue in their upwards flight until, for the year 1918, the rate of 94.4 is reached, this rate being the highest recorded for any of the years shown in this table. The rates for the age groups of 5-9 and 20-29 years continue to increase, as do the rates for practically each age group shown in this table. Not only the maximum rate for all ages was reached during 1918, but the highest rate recorded for any of the years 1905-1918 for the age groups 20-29 and 30-39 years was reached during this year.

TABLE 8.—*Showing the number of deaths from pulmonary tuberculosis in Michigan, as reported to this department by age groups, during each of the years 1905-1918, inclusive.*

Years.	All Ages.	Under 5 years.	5-9 years.	10-19 years.	20-29 years.	30 -39 years.	40-49 years.	50-59 years.	60-69 years.	70-79 years.	80 years and over	Un-known.
1905	2,261	59	17	264	739	484	319	180	116	64	13	6
1906	2,329	77	25	271	743	460	306	212	155	63	17	....
1907	2,316	56	22	260	713	498	311	197	169	75	13	2
1908	2,243	50	23	260	726	460	271	215	149	73	12	4
1909	2,238	49	14	266	706	510	289	200	134	60	7	3
Annual average	**2,277**	**58**	**20**	**264**	**725**	**482**	**299**	**201**	**145**	**67**	**12**	**3**
1910	2,325	69	17	262	764	483	300	201	155	59	12	3
1911	2,330	56	16	268	744	518	292	211	141	70	11	3
1912	2,324	48	22	246	735	494	322	241	149	53	11	3
1913	2,273	59	21	223	744	481	303	230	135	59	8	10
1914	2,364	53	16	222	727	568	342	225	135	61	11	4
Annual average	**2,323**	**57**	**18**	**242**	**743**	**509**	**312**	**222**	**143**	**60**	**11**	**5**
1915	2,556	46	18	258	800	610	312	266	164	68	11	3
1916	2,533	69	34	244	825	580	344	206	152	55	9	15
1917	2,730	44	24	262	860	658	391	249	154	70	9	9
1918	2,955	45	26	304	932	689	410	294	149	82	11	13

TABLE 9.—*Showing the death rates by age groups, per 100,000 population of the corresponding years, from pulmonary tuberculosis in Michigan during each of the years 1905-1918, inclusive.*

Years.	All Ages	Under 5 years.	5-9 years.	10-19 years.	20-29 years.	30-39 years.	40- 49 years.	50-59 years.	60-69 years.	70-79 years.	80 years. and over.
1905	86.3	21.1	6.3	52.4	159.3	129.5	107.6	83.7	86.3	101.0	76.2
1906	87.9	27.1	9.2	53.3	157.2	121.2	101.4	96.3	112.6	97.0	97.2
1907	85.8	19.5	8.1	50.7	148.2	129.1	101.4	87.5	120.0	112.7	72.5
1908	81.9	17.1	8.4	50.3	148.3	117.5	86.8	93.5	103.4	107.2	65.3
1909	80.5	16.6	5.1	51.0	141.7	128.3	91.1	85.1	91.0	86.0	37.2
Annual average	**84.3**	**20.1**	**7.3**	**51.5**	**150.7**	**125.2**	**97.1**	**89.3**	**102.9**	**100.7**	**60.**
1910	82.5	23.0	6.2	49.8	150.8	119.7	93.0	83.8	103.0	82.7	62.3
1911	81.5	18.5	5.8	50.5	144.4	126.5	89.1	86.2	91.7	96.0	55.9
1912	80.2	15.6	7.9	46.0	140.3	118.9	96.7	96.5	94.3	71.1	54.6
1913	77.4	19.0	7.5	41.3	140.0	114.2	89.6	90.3	84.3	77.5	38.9
1914	79.7	16.8	5.7	40.8	134.4	132.9	99.6	86.6	82.6	78.5	52.3
Annual average	**80.2**	**18.6**	**6.5**	**45.2**	**141.8**	**122.5**	**93.7**	**88.9**	**91.1**	**80.5**	**54.6**
1915	84.8	14.4	6.4	47.0	145.6	140.8	89.5	100.5	98.4	85.7	51.3
1916	81.8	21.4	12.0	43.6	148.2	130.0	96.5	74.2	89.5	68.0	41.1
1917	88.3	13.5	8.5	47.0	151.8	147.8	109.9	90.7	88.9	84.8	40.3
1918	94.4	13.6	9.2	54.1	162.0	152.7	114.0	105.2	84.5	97.4	48.3

OCCUPATIONAL DISTRIBUTION OF TUBERCULOSIS.

At the close of the year 1918 this department had on file in this office 21,917 cases of tuberculosis. Out of this number 3,476 cases proved fatal, leaving 18,441 reported living cases of tuberculosis in Michigan at the close of 1918. The occupation of the fatal cases from this disease is also shown in the following table.

It will be noted from this table practically two-thirds of the living cases reported to this department are given to eight occupations, namely, housewives, 4,228, or 23.9 per cent; students, 3,091, or 16.8 per cent; laborers, 1,552, or 8.4 per cent; factory employes, 1,383, or 7.5 per cent; clerks, 954, or 5.2 per cent; farmers, 652, or 3.5 per cent; domestics, 635, or 3.4 per cent; infants, 311, or 1.7 per cent. It may also be noted from the following table that two-thirds of the deaths occurring during the year 1918 from this disease were persons whose occupations are included in the above eight mentioned.

In making the following classification, only the principal occupations are given; the balance are included in miscellaneous occupations.

TABLE 10.—*Showing the occupations of the living cases of tuberculosis in Michigan, as reported to the State Board of Health, at the close of the year 1918, also the occupations of the persons who died from this disease during the year 1918.*

Occupations.	Living cases.	Deaths.	Occupations.	Living cases.	Deaths.
Housewives	4,228	791	Janitors	95	10
Students	3,091	220	Barbers	90	16
Laborers	1,552	469	Metal workers	88	11
Factory employees	1,383	127	Printers	87	28
Clerks	954	134	Cigarmakers	84	13
Farmers	652	230	Teamsters	82	22
Domestics	635	110	Nurses	78	12
Infants	311	205	Saloon men	78	22
			Tailors	77	17
Inmates of prisons, asylums, or hospitals	312	48	Cooks	86	15
Miners	250	44	Mechanics	76	16
Carpenters and contractors	233	50	Laundries	74	6
Machinists	716	91	Chauffeurs	72	23
Painters	175	43	Masons	68	10
Teachers	175	41	Sailors and Fishermen	42	11
Agents	159	23	Electricians	62	9
Stenographers	139	22	Soldiers	56	11
Moulders	117	19	Plumbers	45	10
Dressmakers and Milliners	129	15	Engineers	46	15
Waiters	116	12	Blacksmiths	46	7
Railroad employees	107	19	Bakers	42	3
			Firemen	43	12
Telegraph and Telephone operators	106	14	Shoemakers	43	10
Merchants	102	33	Lumbermen	38	6
Foundries	102	6	Butchers	35	11
Miscellaneous occupations	348	91	Occupations not stated	716	293
			Total	18,441	3,476

TYPHOID FEVER IN MICHIGAN IN 1918 AND PRECEDING YEARS—GENERAL PREVALENCE.

In Table 11 is shown the general prevalence of typhoid fever in Michigan during each of the years 1900-1918; and, as indcated by the number of reported cases, the number of deaths and the death rates per 100,000 population, were lower during 1917 and any of the years since 1900, with the exception of 1915. During the year 1918 there were less cases and deaths reported to this department than in any year shown in this table.

In dividing the years 1900-1917 into two groups, namely, 1900-1908 and 1909-1917, we have reported from all sections of the State during the years constituting the first period 26,994 cases and 6,007 deaths. These 6,007 deaths correspond to an annual average death rate of 26.1 per 100,000 population. During the later period, 1909-1917, there were 22,174 cases and 4,508 deaths. The average annual death rate for this period of years was 17.0 per 100,000 population.

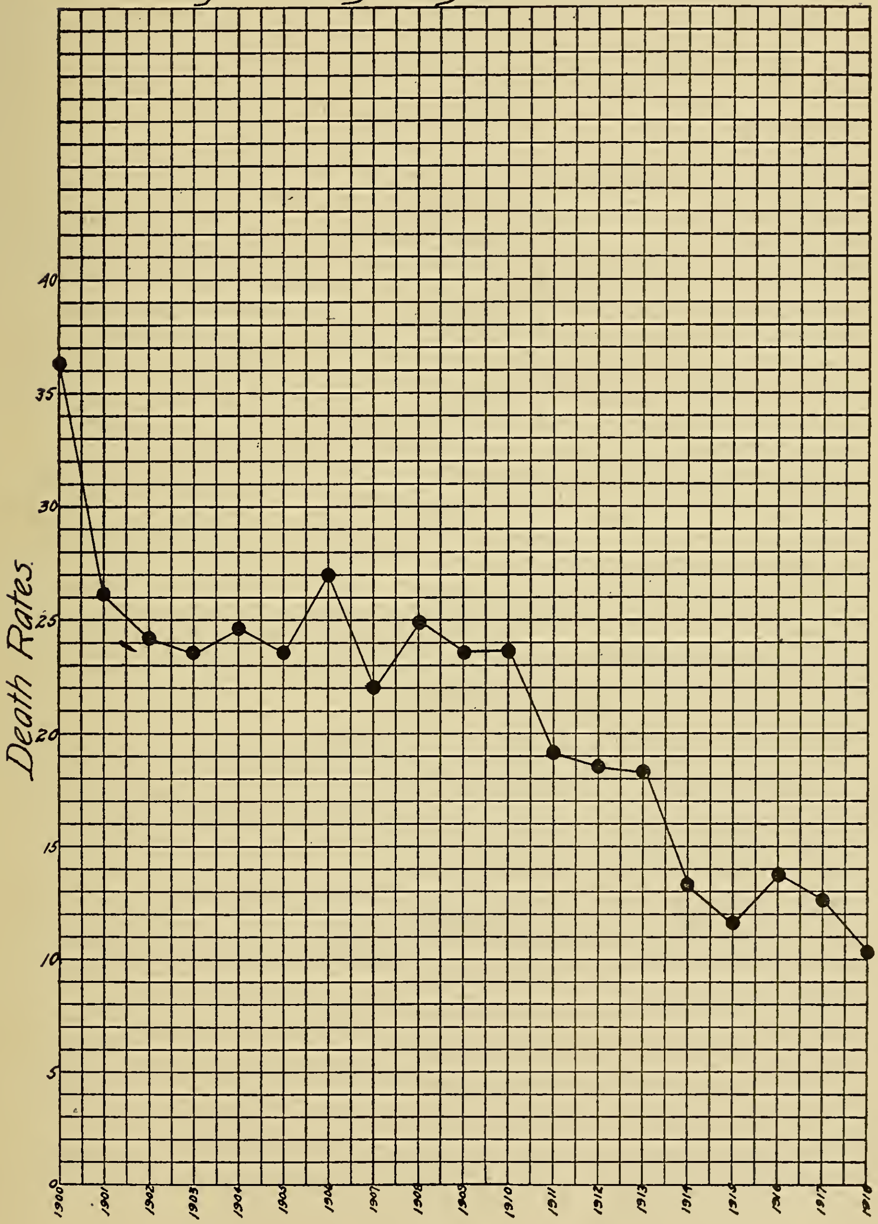
The annual average number of reported cases and deaths during the years 1900-1908 was 2,999 and 667, respectively, while for the years 1909-1917 they were 2,464 and 501. Comparing this data for the two periods, it will be noted that the average annual number of reported cases decreased 535, or 17.8 per cent, while the annual average death rate decreased 34.8 per cent. Comparing the year 1918 with the annual average for the years 1909-1917, it will be noted that the number of reported cases decreased 1,125, or 45.7 per cent; the deaths 179, or 35.7 per cent, and the death rate from 17.0 to 10.3, which is equivalent to a decrease of 39.4 per cent.

As is mentioned in the above paragraph there were on an average a saving of 535 persons from contracting this disease in the latter period over that of the former one. This saving is due no doubt to the improved sanitary conditions of the State, such as improvement of certain water supplies, and making certain localities more sanitary. The saving in the number of deaths in the latter period over that of the former one was an annual average of 166, which is probably due to the more efficacious treatment of this disease.

TABLE 11.—*Showing the prevalence of typhoid fever in Michigan during the years 1900-1918, inclusive.*

Years.	Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1900	5,122	883	17.2	36.4
1901	3,002	664	21.5	26.1
1902	2,456	606	24.7	24.2
1903	2,840	603	21.2	23.7
1904	3,028	637	21.0	24.7
1905	2,774	618	22.3	23.6
1906	3,163	719	22.7	27.0
1907	1,953	594	30.4	22.0
1908	2,656	683	25.7	24.9
Total 1900-1908	**26,994**	**6,007**	**22.2**	**26.1**
1909	2,694	657	24.4	23.6
1910	3,361	667	19.8	23.7
1911	2,660	547	20.6	19.1
1912	2,847	539	18.9	18.6
1913	2,253	539	23.9	18.4
1914	2,167	396	18.3	13.3
1915	1,956	354	18.1	11.7
1916	2,513	422	16.8	13.8
1917	1,723	387	22.5	12.6
Total 1909-1917	**22,174**	**4,508**	**20.3**	**17.0**
1918	1,339	322	24.0	10.3

Diagram showing the prevalence of typhoid fever in Michigan during the years 1900 to 1918.



DISTRIBUTION OF TYPHOID FEVER BY GEOGRAPHICAL SECTIONS OF THE STATE.

As will be seen by the following table the death rates for the years 1917 and 1918 show a decrease over that of the annual average for the years 1904-1916 of 40.3 and 51.2 per cent, respectively. The year 1918 shows a decrease in its death rate of 18.3 per cent over that of the year 1917.

Considered by sections, the death rate registered in the Upper Peninsula for the year 1917 was 10.7 per 100,000 population, which is 22.5 per cent lower than the rate for 1916. It is also 51.5 per cent lower than the average annual rate for this section for the years 1904-1916. The rate for this section during the year 1918 was 6.1 per 100,000 population, which is 43 per cent lower than its rate for the previous year, and it is also 40.8 per cent lower than the rate for the State (10.3) as a whole.

The death rate for the northern section of counties for the years 1917 and 1918 were 9.7 and 7.9 per 100,000 population. As will be seen in comparing these rates with those for the State as a whole they are considerably lower. This section of counties for the years 1917 and 1918 has decreased its death rate from this disease over its average annual rate of 21.9 per 100,000 population, 55.7 and 63.9 per cent, respectively.

The counties constituting the central section of the State had for the year 1917 a death rate from this disease of 11.1 per 100,000 population. While this rate is somewhat higher than the rate for the two sections previously mentioned, it is still a little lower than that for the State, and for 1918 this section has a rate of 14.0 per 100,000 population, which is an increase of 20.7 per cent over its rate for the previous year, although it is considerably less than its average annual rate for the years 1904-1916. This rate of 14.0 for the year 1918 is the highest rate of any of the sections of the State and is 35.9 per cent higher than the rate for the State as a whole.

The southern section of counties had a death rate for 1917 and 1918 of 13.7 and 10.7 per 100,000 population, respectively. These rates compare very favorably with those of the State as a whole for these years. In comparing the rates for 1917 and 1918 for this section with that of its average annual rate for the years 1904-1916, we have a decrease of 34.4 and 48.8 per cent.

During the year 1918 there were fifteen counties out of the eighty-three that did not have any fatal cases of this disease, and we have thirty-four counties which enjoyed a rate that was lower than that of the State as a whole.

TABLE 12.—*Showing the cases, deaths and death rates per 100,000 population from typhoid fever in Michigan and in each of the counties for the years 1918 and 1917, also the average for the years 1904-1916.*

State and counties by geographical sections.	1918.			1917.			Average 1904-1916.		
	Cases.	Deaths.	Death rate per 100,000 population	Cases.	Deaths.	Death rate per 100,000 population.	Cases.	Deaths.	Death rate per 100,000 populatiou.
STATE	1,339	322	10.3	1,723	387	12.6	2,611	595	21.1
I.—Upper Peninsula	76	23	6.1	112	40	10.7	223	72.0	22.1
Alger	2	1	10.9	7	......	......	7	3.0	38.9
Baraga	......	......	......	1	......	......	1	.2	3.2
Chippewa	13	1	3.7	14	4	14.9	23	5.0	20.4
Delta	23	6	17.0	13	7	20.2	37	18.0	59.5
Dickinson	2	1	4.3	7	4	17.7	8	1.5	7.3
Gogebic	1	......	......	5	3	10.6	9	5.0	21.3
Houghton	6	3	2.8	3	3	2.9	31	10.0	11.3
Iron	1	1	4.9	1	1	5.1	8	2.5	16.3
Keweenaw	1	1	9.7	1	......	......	2	.2	2.8
Luce	1	1	20.6	1	1	21.1	4	2.3	57.1
Mackinac	5	......	......	4	2	19.3	3	1.3	14.0
Marquette	16	5	9.8	47	10	19.6	57	12.0	25.7
Menominee	1	......	......	4	4	16.2	13	8.0	31.2
Ontonagon	2	2	18.7	3	1	9.6	18	2.3	26.4
Schoolcraft	2	1	10.7	1	......	......	3	.9	10.3
II.—Northern Counties	114	28	7.9	144	35	9.7	351	72.0	21.9
Alcona	......	......	......	2	......	......	4	.6	10.5
Alpena	4	1	4.7	23	4	18.9	40	8.6	43.0
Antrim	1	......	......	4	1	6.6	14	4.0	25.5
Arenac	......	......	......	2	3	30.6	3	.9	9.3
Benzie	8	3	26.2	13	1	8.8	29	2.0	18.8
Charlevoix	4	1	4.3	3	......	......	13	3.0	13.1
Cheboygan	2	1	5.0	3	......	......	10	2.4	13.4
Clare	2	......	......	8	......	......	8	1.4	15.1
Crawford	5	1	21.0	3	......	......	5	.6	15.2
Emmet	5	3	14.5	4	1	4.9	14	4.0	21.5
Gladwin	13	2	20.1	4	1	10.2	10	1.6	18.9
Grand Traverse	1	1	3.8	4	2	7.6	48	7.0	29.3
Iosco	9	2	21.3	2	......	......	7	1.6	16.4
Kalkaska	3	1	11.2	13	3	34.1	11	3.0	37.0
Lake	......	......	......	2	......	......	3	.5	10.1
Leelanau	2	......	......	5	......	......	4	1.5	14.1
Manistee	7	2	7.5	14	5	19.2	26	5.7	21.3
Mason	5	2	8.2	5	2	8.3	18	4.0	18.3
Missaukee	2	1	8.6	3	1	8.7	8	2.0	18.8
Montmorency	15	1	23.9	3	2	48.4	3	.9	23.9
Ogemaw	3	......	......	4	1	10.3	10	2.2	24.6
Osceola	5	1	5.6	3	1	5.6	16	3.2	17.9
Oscoda	......	......	......	......	......	......	2	......	......
Otsego	4	2	29.1	......	......	......	8	3.0	45.7
Presque Isle	8	2	15.1	2	1	7.7	11	2.0	17.7
Roscommon	......	......	......	......	......	......	1	.2	8.8
Wexford	6	1	4.2	15	6	25.4	25	6.0	28.6
III.—Central Counties	251	66	14.0	203	52	11.1	380	95.0	20.8
Bay	43	12	16.4	35	10	13.8	58	20.6	30.1
Gratiot	29	7	25.1	21	5	17.8	29	5.5	19.1
Huron	17	5	14.2	10	4	11.4	19	4.5	12.9
Isabella	22	4	17.2	9	1	4.3	25	4.0	17.4
Mecosta	8	2	10.8	8	2	10.8	15	4.4	22.6
Midland	34	9	66.0	10	2	14.6	23	4.6	32.9
Montcalm	12	3	9.5	12	1	3.2	18	5.6	17.5
Muskegon	10	6	13.8	10	4	9.3	22	7.0	17.2
Newaygo	1	1	4.4	5	4	19.7	12	3.5	18.2
Oceana	2	1	5.0	5	1	5.1	13	2.8	15.2
Saginaw	54	12	12.5	64	12	12.6	100	20.8	23.2
Sanilac	5	2	6.1	9	2	6.0	24	6.0	17.7
Tuscola	14	2	5.9	5	4	11.7	20	6.0	17.2

TABLE 12.—*Concluded.*

State and counties by geographical sections.	1918.			1917.			Average 1904-1916.		
	Cases.	Deaths.	Death rate per 100,000 population.	Cases.	Deaths.	Death rate per 100,000 population.	Cases.	Deaths.	Death rate per 100,000 population.
IV.—Southern Counties..	898	205	10.7	1,264	260	13.7	1,657	356.0	20.9
Allegan..................	13	......	......	13	3	7.4	22	5.5	13.8
Barry..................	11	2	8.8	5	1	4.4	15	2.4	10.6
Berrien..................	22	4	7.7	21	3	5.3	47	10.4	19.4
Branch..................	1	1	4.3	7	4	16.7	12	2.5	9.8
Calhoun..................	31	3	4.8	24	9	14.5	53	10.8	19.0
Cass..................	6	3	14.7	4	1	4.9	18	3.0	14.7
Clinton..................	4	......	......	40	6	27.7	21	4.0	17.3
Eaton..................	12	3	10.2	9	2	6.7	30	6.0	19.7
Genesee..................	79	17	20.4	133	25	31.2	102	17.5	26.9
Hillsdale..................	7	1	3.4	24	1	3.4	24	5.2	17.5
Ingham..................	45	9	14.6	67	6	9.8	81	12.5	23.3
Ionia..................	11	1	3.0	7	3	9.1	25	6.0	17.9
Jackson..................	22	4	6.9	13	2	3.4	67	9.2	17.2
Kalamazoo..................	29	3	4.1	19	3	4.2	60	8.7	14.3
Kent..................	59	11	6.6	83	20	11.1	305	44.0	27.5
Lapeer..................	26	6	23.9	18	3	12.1	23	5.0	19.2
Lenawee..................	26	5	10.5	12	4	8.4	32	8.8	18.4
Livingston..................	12	3	18.6	5	1	6.1	22	4.3	24.3
Macomb..................	11	5	15.7	16	6	18.8	19	6.6	20.2
Monroe..................	16	2	6.1	17	1	3.0	32	5.5	10.6
Oakland..................	40	7	13.1	24	5	9.4	33	9.5	19.1
Ottawa..................	2	1	2.0	8	1	2.0	24	6.3	13.9
St. Clair..................	11	3	6.0	19	7	13.9	87	20.7	39.6
St. Joseph..................	7	2	7.5	6	......	......	10	1.7	6.7
Shiawasee..................	9	4	12.3	8	2	6.1	24	5.6	16.9
Van Buren..................	7	4	12.8	14	2	6.0	59	8.5	25.6
Washtenaw..................	24	7	16.6	54	6	14.1	31	6.8	15.2
Wayne..................	355	94	13.7	594	133	20.0	379	118.5	22.1

DISTRIBUTION OF TYPHOID FEVER IN CITIES OF MICHIGAN HAVING 10,000 OR MORE INHABITANTS.

The reported cases, death and death rates per 100,000 population from typhoid fever in cities of Michigan having 10,000 or more inhabitants during 1918 and preceding years are shown in Table 13.

It will be noted by the data in this table that the death rates for the year 1917 and 1918 for all these cities combined show a decrease over that of former years. This is especially true for the year 1918. The decrease during this year over that of the former ones is very noticeable. As compared with the previous year it is 36.1 per cent less. In comparing the rate for this year with the annual average rate for the years 1905-1911, and for the years 1912-1918 we find that it is 60.1 per cent less than that of the former and 40.1 per cent less than that of the latter period.

During the seven years, 1905-1911, there were reported to this department from all of these cities combined 7,998 cases of typhoid fever. In this number are included 1,951 deaths. These deaths correspond to an annual average death rate of 28.8 per 100,000 population. During the next seven years, or from 1912 to 1918, inclusive, there were reported to this department 8,448 cases, of which number 1,596 proved fatal. The annual average death rate for this period of years was 19.2 per 100,000 population, which is a decrease of 33.3 per cent for the latter period over that of the former. While the number of cases reported increased from 7,998 in the first period to 8,448 in the second, or an increase of 450 cases, this cannot be taken as an indication that the disease showed an increased prevalence, but indicates a better reporting of recognized cases and an increase in the population of these cities. It might be well to state that the annual average number of cases in the first period was 118.1 per 100,000 population, while in the latter it was 102.6 per 100,000 population. This decrease in the attack rate shows that the prevalency of this disease was less in the latter period.

As between the two seven-year periods, 1905-1911 and 1912-1918, of the twenty-three cities shown in this table, only two showed an increase in their death rate, while twenty-one showed decreases. The only cities showing an increase in their rate are Ann Arbor and Saginaw. This increase in Ann Arbor occurred during the three last years. During the year 1916 the high death rate was due to an epidemic in that city which was caused by milk, and the last two years a large per cent of the cases were caused by outside sources, such as people coming to the city who were infected with this disease. The increase in the rate for the city of Saginaw is no doubt due to the impure water supply.

The slight decrease in the rate for the city of Manistee is probably due to the increase of population, instead of any improvement of its water supply.

TABLE 13.—*Showing the reported cases, deaths and death rates, per 100,000 population of 10,000 or over in 1910*

		1905	1906	1907	1908	1909	1910	1911
CITIES (total)	**Cases....**	**1,061**	**1,136**	**798**	**885**	**948**	**1,782**	**1,388**
	Deaths..	**249**	**286**	**281**	**282**	**280**	**326**	**247**
	Rates....	**28.1**	**31.2**	**29.7**	**28.8**	**27.8**	**31.4**	**23.1**
Adrian........	Cases....	....	6	4	7	16	2	3
	Deaths...	....	5	4	2	4	2	3
	Rates....	....	47.6	37.3	18.6	37.2	18.6	27.8
Alpena........	Cases....	6	10	3	10	23	7	17
	Deaths...	4	7	3	9	8	5	12
	Rates....	32.6	56.0	23.9	71.4	63.2	39.3	94.0
Ann Arbor.....	Cases....	8	12	12	8	9	13	11
	Deaths...	2	3	1	2	3	5	3
	Rates....	13.7	20.4	6.8	13.6	20.3	33.7	20.2
Battle Creek...	Cases....	73	58	24	42	40	33	8
	Deaths...	9	8	6	10	9	8	4
	Rates....	39.5	34.3	25.2	41.1	36.2	31.5	15.4
Bay City......	Cases....	12	26	18	22	17	28	170
	Deaths...	10	20	17	20	16	11	19
	Rates....	24.1	47.3	39.5	45.7	35.9	24.3	41.2
Detroit........	Cases....	70	95	109	148	95	634	421
	Deaths...	69	79	104	84	92	108	78
	Rates....	20.3	20.7	25.5	19.6	20.5	23.0	15.8
Escanaba......	Cases....	21	14	32	27	44	8	10
	Deaths...	21	12	27	16	30	8	6
	Rates....	182.9	101.4	221.4	127.4	232.4	60.3	44.0
Flint..........	Cases....	8	6	18	16	164	206	63
	Deaths...	3	6	7	11	21	40	8
	Rates....	15.6	25.8	25.6	35.1	59.4	101.6	18.4
Grand Rapids..	Cases....	518	352	193	193	229	238	222
	Deaths...	48	39	33	33	19	32	31
	Rates....	48.6	38.4	31.6	30.7	17.2	28.3	266.7
Ironwood......	Cases....	6	4	5	5	9	3	2
	Deaths...	6	4	4	5	9	2	1
	Rates....	57.0	36.3	34.8	41.8	72.3	15.5	7.5
Ispheming.....	Cases....	7	2	17	5	2	5	7
	Deaths...	1	2	6	....	1	2	1
	Rates....	8.5	16.8	49.8	....	8.1	16.0	7.9
Jackson........	Cases....	88	115	45	53	60	60	71
	Deaths...	16	6	7	5	6	10	9
	Rates....	60.5	21.8	24.5	16.9	19.6	31.6	27.5
Kalamazoo.....	Cases....	65	73	68	61	26	101	44
	Deaths...	6	14	6	13	3	13	4
	Rates....	19.0	42.2	17.2	35.6	7.9	32.7	9.7
Lansing........	Cases....	13	79	31	55	61	115	57
	Deaths...	9	17	4	14	4	15	5
	Rates....	40.4	70.4	15.4	50.2	13.4	47.4	14.9
Manistee......	Cases....	10	18	15	22	12	19	10
	Deaths...	1	1	6	5	4	2	1
	Rates....	7.5	7.9	47.9	40.1	32.2	16.2	8.1

population, from typhoid fever in each of the cities in Michigan having an estimated during each of the years 1905-1918, inclusive.

Total cases and deaths and annual average death rate 1905-1911.	1912	1913	1914	1915	1916	1917	1918	Total cases and deaths and annual average death rate 1912-1918.	Per cent increase (+), or decrease (−) between the two periods, 1905-1911 and 1912-1918.
7,998	1,707	1,112	1,238	1,179	1,625	1,016	666	8,503	−33.3
1,951	299	287	207	196	237	220	147	1,596	
28.8	27.4	24.5	17.8	16.4	19.7	18.0	11.5	19.2	−33.3
38	1	2	2	2	2	2	3	14	
20	......	2	2	2	2	2	3	13	−34.9
26.1	....	18.0	17.8	17.6	17.5	17.3	25.7	16.4	
76	8	88	147	92	30	22	3	390	
48	7	12	9	9	1	3	1	42	
53.9	54.2	92.3	68.8	68.3	7.5	22.4	7.4	45.5	−15.6
73	5	6	6	9	122	33	21	202	
19	2	....	2	2	8	4	5	23	
18.3	13.4	....	13.4	13.4	53.3	26.6	33.2	22.0	+8.9
278	45	27	6	8	15	15	19	135	
54	6	12	3	5	2	7	2	37	
31.6	22.4	43.7	10.7	17.4	6.8	24.7	6.5	18.3	−42.1
293	45	9	31	50	168	31	38	372	
113	32	7	16	10	18	9	8	100	
36.8	69.3	15.0	34.0	21.1	37.5	18.6	16.4	30.1	−18.2
1,572	420	475	507	435	458	472	293	3.060	
614	88	153	76	75	89	107	65	653	
20.5	17.5	29.4	14.1	13.5	15.6	18.1	10.7	16.8	−18.0
156	5	9	1	11	16	7	18	67	
120	5	9	1	4	7	6	5	37	
136.2	35.7	62.6	6.8	26.5	44.9	37.4	30.3	34.9	−74.4
481	65	45	86	114	238	126	64	738	
96	11	7	13	5	27	25	13	101	
43.7	24.8	14.9	26.2	9.6	49.4	43.6	21.7	27.6	−36.6
1,945	344	150	170	195	145	70	49	1,123	
235	40	22	34	35	20	17	10	178	
31.2	33.9	18.2	27.6	27.8	15.6	13.0	7.5	20.2	−35.2
34	1	2	11	6	8	4	1	33	
31	....	1	5	3	4	2	....	15	
36.8	....	7.2	35.3	20.7	27.4	13.6	....	14.8	−60.0
45	2	17	3	7	5	1	1	36	
13	......	3	1	2	2	1	1	10	
15.6	....	24.6	8.3	16.1	16.7	8.4	9.3	11.9	−23.7
492	55	13	55	14	27	8	8	180	
59	6	4	7	1	6	1	2	227	
28.4	18.3	12.0	20.5	2.9	17.0	2.8	5.5	11.1	−60.9
438	47	25	15	22	38	16	26	189	
59	10	4	2	3	3	2	2	26	
23.0	23.4	9.0	4.4	6.3	6.1	4.0	3.9	7.8	−66.1
411	78	40	32	14	119	61	30	374	
68	7	1	7	1	9	6	5	36	
34.8	20.3	2.8	18.7	2.6	22.2	14.3	11.5	13.2	−62.1
106	5	12	5	11	14	8	2	57	
20	....	5	1	4	3	3	2	18	
23.2	....	42.5	8.6	32.3	26.8	35.4	18.5	22.6	−2.6

TABLE 13

		1905	1906	1907	1908	1909	1910	1911
Marquette	Cases	17	23	18	17	7	34	17
	Deaths	4	4	8	5	6	11	11
	Rates	37.0	36.5	72.1	44.5	52.7	95.3	94.2
Menominee	Cases	6	10	15	6	9	23	22
	Deaths	5	8	9	6	6	7	7
	Rates	45.5	73.5	83.4	46.1	56.7	66.7	67.4
Muskegon	Cases	30	18	14	19	19	28	20
	Deaths	6	7	3	7	....	6	5
	Rates	27.9	31.8	13.3	30.3	....	24.8	20.2
Pontiac	Cases	4	4	3	4	10	59	50
	Deaths	3	3	3	1	2	8	7
	Rates	25.1	24.0	23.0	7.4	14.2	54.6	46.1
Port Huron	Cases	10	26	54	11	13	64	44
	Deaths	3	11	9	4	11	14	9
	Rates	15.1	56.1	46.3	20.8	57.8	7.44	48.3
Saginaw	Cases	32	40	42	74	34	38	65
	Deaths	12	12	9	14	15	11	12
	Rates	25.4	25.0	18.5	28.4	30.0	21.7	23.4
Sault Ste. Marie	Cases	21	7	28	33	23	30	27
	Deaths	8	7	2	9	7	3	7
	Rates	68.6	59.0	16.6	73.4	56.2	23.7	54.5
Traverse City	Cases	36	138	30	47	26	34	27
	Deaths	3	11	3	7	4	3	4
	Rates	26.3	95.3	25.6	59.1	33.3	24.7	32.5

—Concluded.

Total cases and deaths and annual average death rate 1905-1911.	1912	1913	1914	1915	1916	1917	1918	Total cases and deaths and annual average death rate 1912-1918.	Per cent increase (+) or decrease (−) between the two periods, 1905-1911 and 1912-1918.
133	127	19	13	19	35	33	12	258	
49	13	4	2	4	6	5	4	38	
62.2	109.9	23.4	16.5	32.6	48.3	40.0	31.5	44.3	−28.8
91	6	3	10	3	3	2	1	28	
48	2	1	3	2	3	2	....	13	
64.6	20.0	10.3	31.5	19.0	33.1	22.7	....	20.0	−69.0
148	6	9	9	16	4	8	2	54	
34	3	9	4	5	....	4	2	27	
21.2	12.1	35.8	15.7	19.4	....	15.1	7.5	15.0	−29.2
134	40	14	7	4	8	13	15	101	
27	8	2	1	2	2	3	3	21	
28.7	51.1	12.4	6.0	11.7	11.4	16.7	16.2	17.6	−38.7
222	242	10	25	10	16	1	2	306	
61	37	5	....	4	5	1	2	54	
45.3	196.8	26.6	....	21.2	26.8	5.4	10.7	41.2	−9.1
325	121	102	83	125	82	45	44	602	
85	16	18	14	17	16	7	10	98	
24.5	30.6	33.9	25.9	31.0	28.8	12.4	17.5	25.5	+4.1
169	12	25	14	7	25	34	13	130	
43	3	3	4	1	1	4	1	17	
49.0	22.9	22.6	29.6	7.3	7.2	28.3	7.0	17.7	−63.9
338	27	10	....	5	7	4	1	54	
35	3	3	....	....	3	2	1	12	
42.2	23.6	23.1	....	....	21.7	14.2	7.0	12.6	−70.1

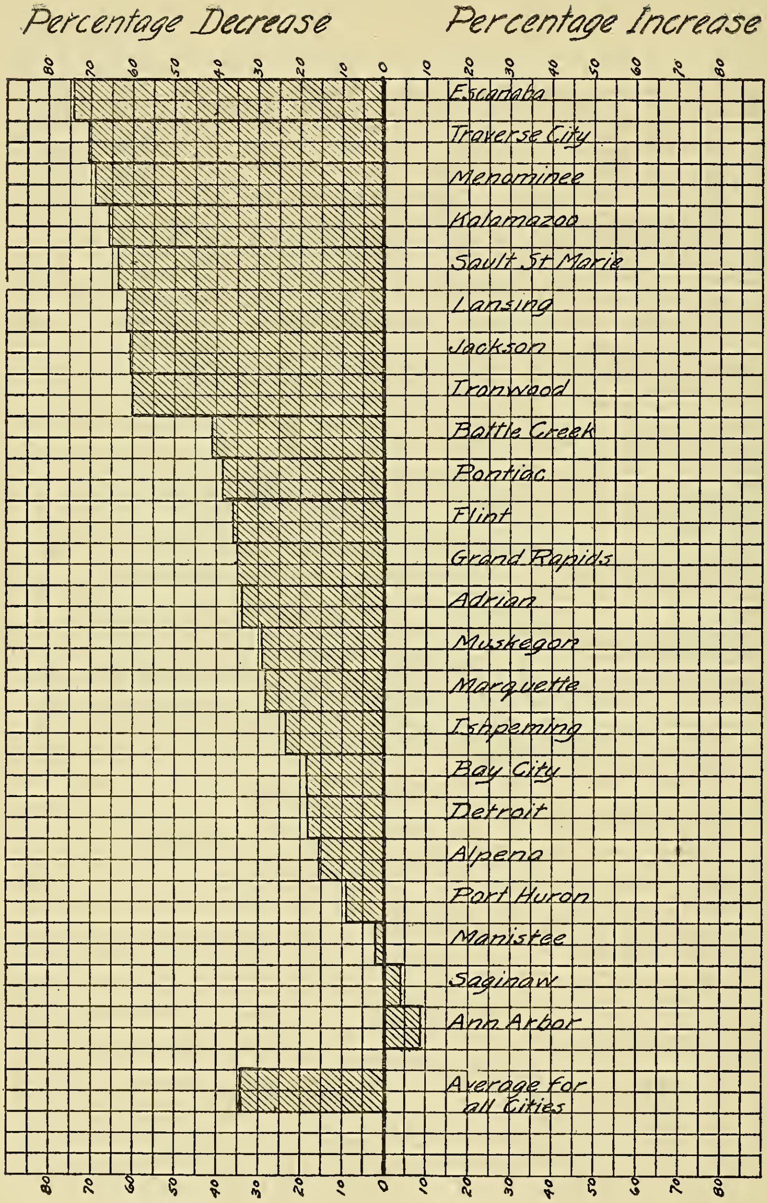


Diagram showing the percent increase and decrease in the annual death rate from typhoid fever in cities of Michigan of 10,000 population and over, as between the two 7-year periods 1905-1911 and 1912-1918.

AGE AND SEX DISTRIBUTION OF THE CASES OF TYPHOID FEVER IN MICHIGAN REPORTED TO THIS DEPARTMENT DURING THE YEARS 1913 TO 1918.

In the following table is shown the age and sex distribution of 11,951 cases of typhoid fever, as reported to this department during the six years 1913 to 1918, inclusive, as indicated by the ratio of cases among those of each sex at each age group to the total number of reported cases of both sexes and at all ages. This table also shows the attack frequency as indicated by the ratio of cases among those of each sex and all ages and at the various age groups to each 100,000 population of corresponding sex and age.

Of the 11,951 cases reported during these six years, 59.6 per cent were males and 40.4 per cent were females. During the ages of from 5 to 35 years this disease seems to be more prevalent; practically two-thirds of all the cases are between these two ages. The single age group registering the highest per cent of cases is 20-24 years. The per cent for this period of years is 15.5.

As the per cents simply show the distribution of cases and take no account of age distribution of the population, and therefore do not show the attack frequency, the figures in the last three columns of the following table should be considered in determining the comparative susceptibility to this disease as between the sexes at all ages and at various ages, and as between those of the various ages of the same sex.

It will be noted, in the last three columns of this table, that among both sexes combined and at all ages the annual average case rate for the six years stated was 65.7 per 100,000 of the total population. Considered by sex, the males, at all ages, show a case rate of 75.5 per 100,000 of the male population, while the rate for the females was 55.0 per 100,000 of the female population.

At every age group, with the exception of 5-9 years, the males show a greater susceptibility to this disease than do the females, although at the ages of under 5 years the susceptibility is practically the same. The case rate for both sexes increases until the ages of 20-24 years is reached. After this age the rate gradually decreases. As the age increases the possibility of being attacked with typhoid fever grows more equal as between the sexes.

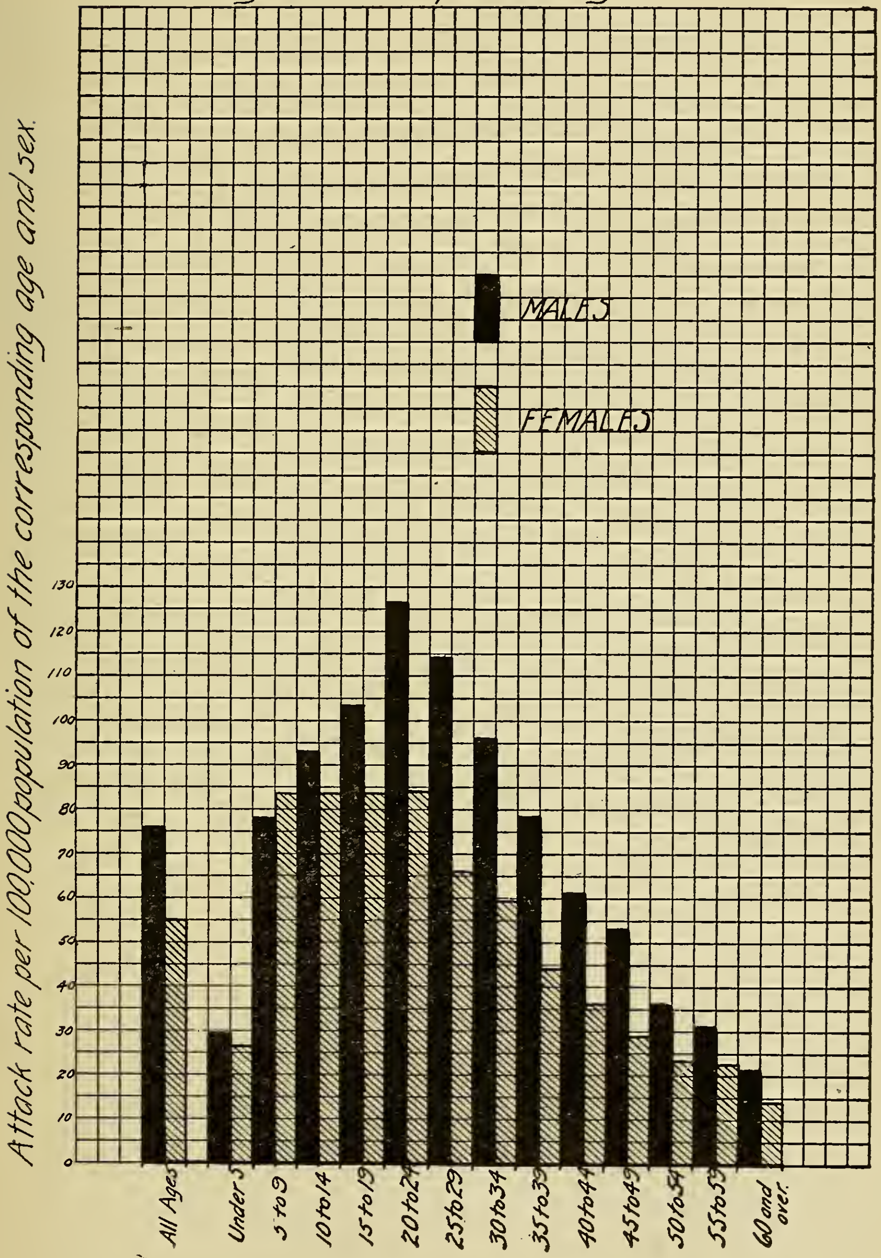
In comparing the attack rates at the various ages among those of the same sex, it will be seen that the case rates are at a minimum among those of the very young and the very old. Among the males under 5 years of age, the attack rate was 29.4 per 100,000 of the male population of that age, the rate increasing until the age of 20-24 is reached, which is the maximum for the males. After this age the rate decreases steadily with the advancement of age, the lowest rate being at the oldest age group. As for the females, the same holds true. The minimum rates are at the youngest and oldest age groups and the maximum rate is reached at the 20-24-year age group.

In considering the attack rates by sex, it will be seen that the males are more liable to contract this disease than the females. This is especially true in the middle age of life. One explanation of this would be that the males are subject to a greater degree of exposure to this disease than the females. It will be noticed that at the two extremes of life the difference in the attack rates does not differ as much as it does in the middle age, during these years the degree of exposure between the sexes being more equal.

TABLE 14.—*Showing the age and sex distribution of cases of typhoid fever, as indicated by the ratio of cases among each sex at the various age groups to the total number of reported cases of both sexes and at all ages. Also showing the comparative susceptibility of each sex at the various ages to typhoid fever, as indicated by the annual case rate per 100,000 population of corresponding age and sex. This data is based on Michigan statistics for the years 1913 to 1918 combined.*

Age groups.	Total cases.			Per cent of total cases.			Average annual case rate per 100,000 population of corresponding age and sex.		
	Both Sexes	Males.	Females.	Both Sexes	Males.	Females.	Both Sexes	Males.	Females.
ALL AGES....	**11,951**	**7,129**	**4,822**	**100.0**	**59.6**	**40.4**	**65.7**	**75.5**	**55.0**
Under 5 years..	538	286	252	4.5	2.4	2.1	28.0	29.4	26.6
5–9 years....	1,363	669	694	11.4	5.6	5.8	80.7	78.1	83.1
10–14 years....	1,401	747	654	11.7	6.3	5.4	88.2	92.8	83.4
15–19 years....	1,598	897	701	13.4	7.5	5.9	93.1	103.2	83.8
20–24 years....	1,847	1,142	705	15.5	9.6	5.9	106.5	126.7	84.5
25–29 years....	1,449	956	493	12.1	8.0	4.1	91.2	114.1	65.7
30–34 years....	1,081	689	392	9.0	5.8	3.2	78.5	95.8	59.5
35–39 years....	766	505	261	6.4	4.2	2.2	61.9	78.2	44.2
40–44 years....	537	349	188	4.5	2.9	1.6	49.4	61.2	36.4
45–49 years....	419	282	137	3.5	2.4	1.1	41.4	53.1	28.6
50–54 years....	279	179	100	2.3	1.5	0.8	30.2	36.4	23.3
55–59 years....	182	113	69	1.5	0.9	0.6	26.8	31.4	22.3
60 yrs. and over	298	184	114	2.5	1.5	1.0	18.4	21.6	14.5
Ages not stated.	193	131	62	1.6	1.1	0.5	....	......	....

Typhoid fever - Relative probability of attack, by sexes, at all ages and at specified ages.



RELATION OF AGE AND SEX TO CASE FATALITY IN TYPHOID FEVER IN MICHIGAN, BASED ON MICHIGAN STATISTICS FOR THE THE SIX YEARS, 1913 TO 1918 COMBINED.

In the preceding table was shown the comparative probability of being attacked with typhoid fever between the sexes at all ages and at the various ages; also between the ages of those of the same sex. The study of the relation of age and sex to typhoid fever will be concluded by showing the comparative probability of dying from this disease after attack between the sexes at all ages and the various ages and between the various ages of those of the same sex. The data shown in the following table should be studied in conjunction with the preceding table.

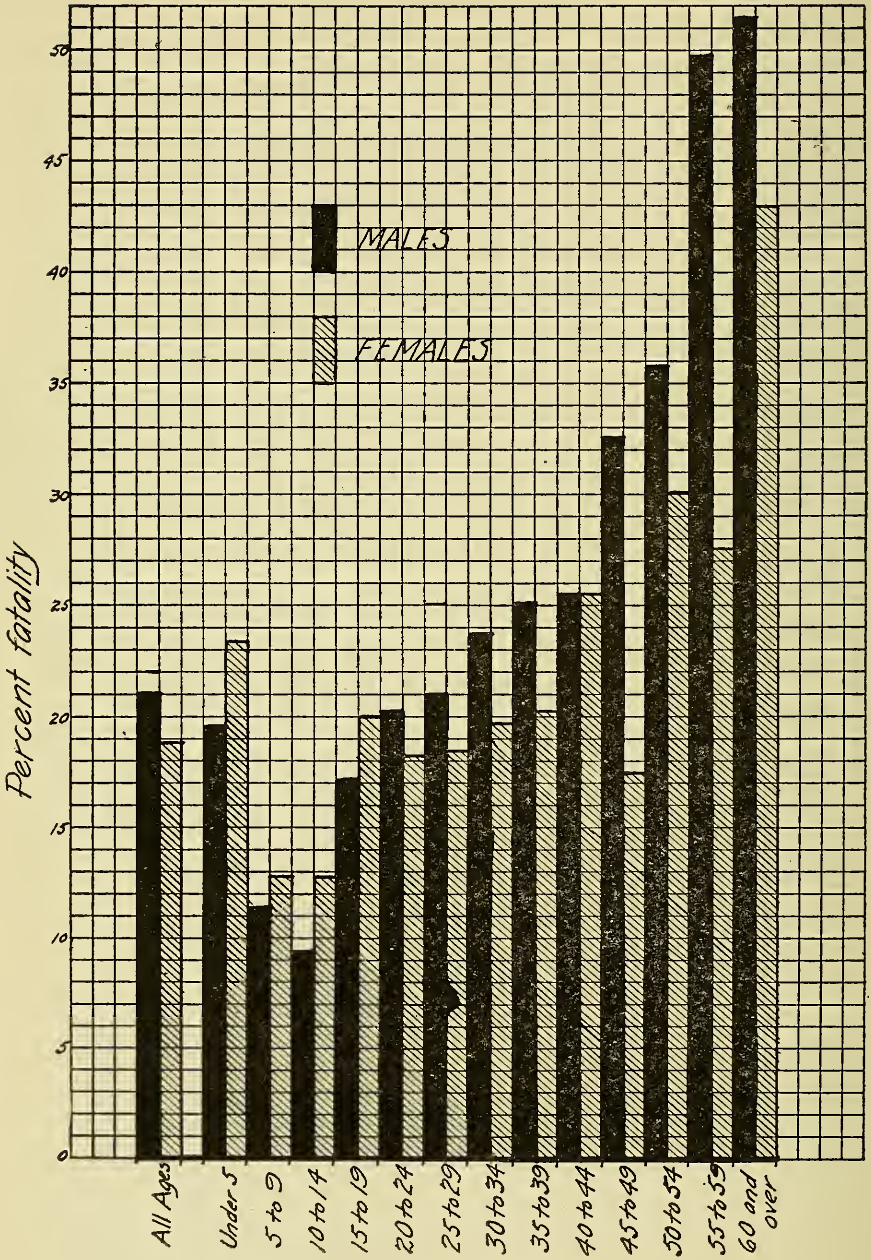
Of the 11,951 cases of typhoid fever reported to this department during this six years, or from 1913 to 1918, 2,420 cases, or 20.3 per cent, proved fatal. Of the 7,129 cases among the males, 1,508, or 21.1 per cent, proved fatal, while 18.9 per cent of the female cases were fatal. As was shown in the preceding table, the males at all ages are not only more liable to contract this disease than the females, but they are more liable to die after being attacked than the females. It will also be noted that the case fatality, as well as the attack rate, shows wide variations at the various age groups. In general, the fatality rate is the lowest at the age groups of 5-9 and 10-14 years, rising slowly as the ages increase, the maximum being at the oldest age group. For the ages of under 5 years and from 5-20 years, which are the school years, the females show a greater probability of dying from this disease, after being attacked than do the males, but in every age group from 20-60 years and over the males show a greater probability of dying after being attacked than do the females.

The error in these statistics lies in the failure to recognize and report cases of typhoid fever, and the fatality rate is therefore, in all probability, too high. There is no reason, however, to suspect that the failure to report recognized cases affects one sex or age group more than another, and while the ratio of cases as to deaths may be low in general, the relation of the fatality rates between the sexes at all ages and at different ages, and between the different ages of those of the same sex, is in all probability approximately correct.

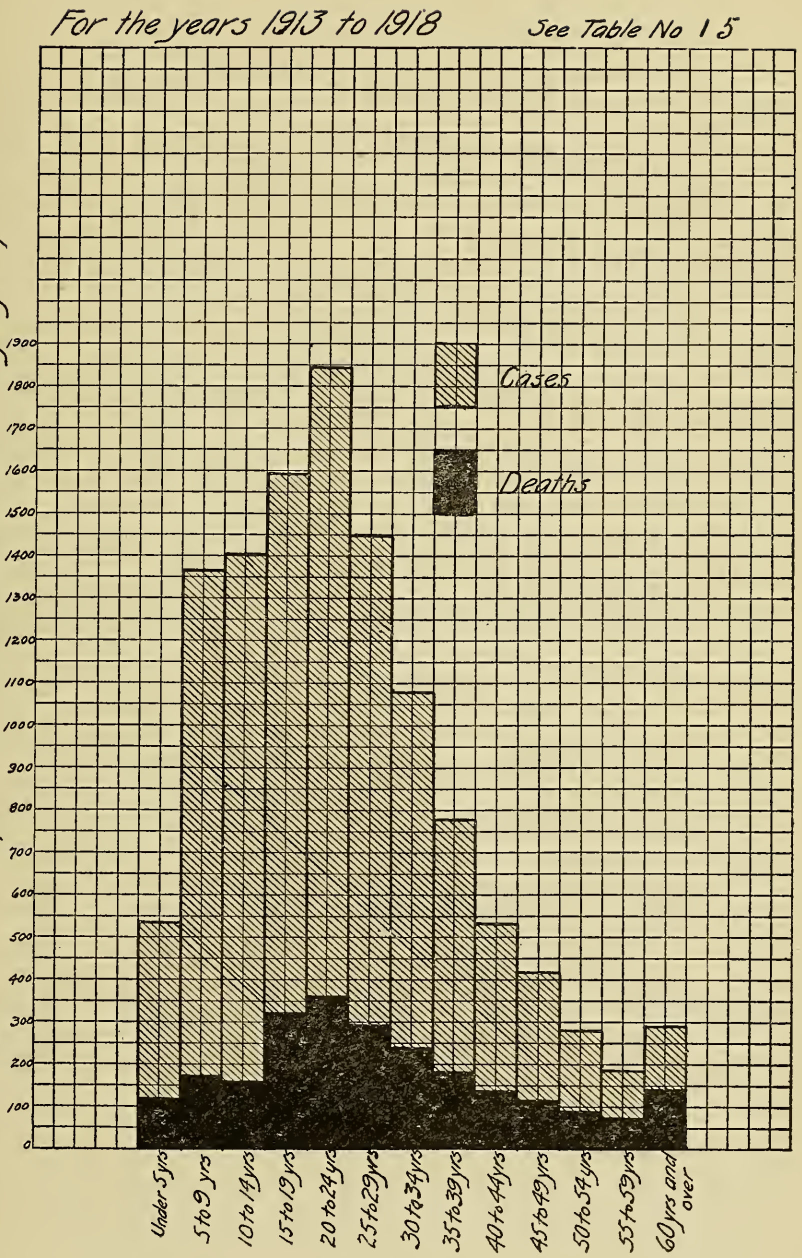
TABLE 15.—*Showing the relation of age and sex to case fatality in typhoid fever, as indicated by the per cent of deaths registered at each age group, and each sex to the total number of reported cases taken sick at corresponding age and sex. This data is based on Michigan statistics, and covers the years 1913 to 1918 combined.*

	Total.			Males.			Females.		
	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
ALL AGES....	**11,951**	**2,420**	**20.3**	**7,129**	**1,508**	**21.1**	**4,822**	**912**	**18.9**
Under 5 years..	538	115	21.4	286	56	19.6	252	59	23.4
5 –9 years....	1,363	165	12.1	669	76	11.4	694	89	12.8
10–14 years....	1,401	153	10.9	747	70	9.4	654	83	12.7
15–19 years....	1,598	314	19.7	897	174	17.2	701	140	20.0
20–24 years....	1,847	359	19.4	1,142	231	20.2	705	128	18.2
25–29 years....	1,449	292	20.2	956	201	21.0	493	91	18.5
30–34 years....	1,081	241	22.3	689	164	23.8	392	77	19.6
35–39 years....	766	179	23.4	505	126	25.0	261	53	20.3
40–44 years....	537	137	25.5	349	89	25.5	188	48	25.5
45–49 years....	419	116	27.7	282	92	32.6	137	24	17.5
50–54 years....	279	94	33.7	179	64	35.8	100	30	30.0
55–59 years....	182	75	41.2	113	56	49.6	69	19	27.5
60 yrs. and over	298	144	48.3	184	95	51.6	114	49	43.0
Ages not stated.	193	36	18.7	131	14	10.7	62	22	35.5

Typhoid fever - Probability of dying after attack, by sexes, at all ages, and at specific ages.



Typhoid fever - The relation of age to case fatality as indicated by the number of cases reported and who died at each age group.



SEASONABLE PREVALENCE OF TYPHOID FEVER IN MICHIGAN, BASED ON MICHIGAN STATISTICS FOR THE YEARS 1913 TO 1918 COMBINED.

In Table 16 is shown the distribution by months of the 11,951 cases of typhoid fever reported to this department during the years 1913 to 1918 inclusive.

As will be seen by the data shown in the following table, the males on a whole show a greater susceptibility to this disease than do the females, but comparing this data by months we find that the prevalency as to sex is practically the same.

Among both sexes combined, the months in which the greatest number were taken sick were August, September and October; 41.8 per cent of all the cases reported during the six years mentioned were taken sick during these three months. The month in which the least number of cases were reported was May. During the first seven months of the year, or from January to July, inclusive, the number of cases reported remained quite uniform, while during the month of August the number increased considerably, and in September we find the maximum number of attacks was reached. For the months of November and December the prevalency of this disease was practically the same as for the months of from January to July.

TABLE 16.—*Showing the relation of seasonal prevalence and sex to typhoid fever, as indicated by the ratio of cases taken sick in each month among each sex to the total reported cases of each sex. This data is based on Michigan statistics, and is for the years 1913 to 1918, inclusive.*

Month.	Total.		Males.		Females.	
	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.
Total	**11,951**	**100.0**	**7,129**	**100.0**	**4,822**	**100.0**
January	699	5.8	404	5.7	295	6.1
February	734	6.1	421	5.9	313	6.5
March	680	5.7	388	5.4	292	6.1
April	703	5.9	421	5.9	282	5.8
May	572	4.8	357	5.0	215	4.5
June	679	5.7	407	5.7	272	5.6
July	929	7.8	592	8.3	337	7.0
August	1,579	13.2	924	13.0	655	13.6
September	1,895	15.9	1,095	15.4	800	16.6
October	1,523	12.7	928	13.0	595	12.3
November	872	7.3	494	6.9	378	7.8
December	638	5.3	407	5.7	231	4.8
Not stated	448	3.7	291	4.1	157	3.3

Typhoid fever – Seasonal prevalence, as shown by the percent of total cases each month. Also seasonal fatality, as indicated by percent fatality of cases each month. Michigan statistics 1913-1918.

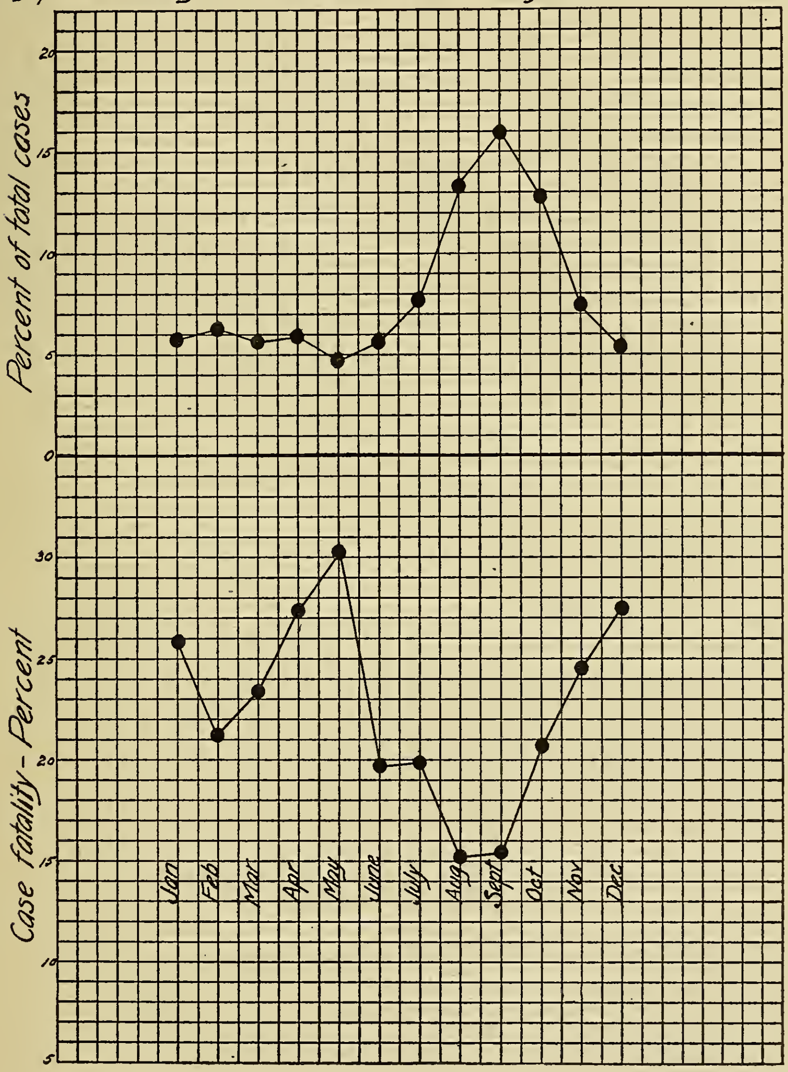


TABLE 17.—*Showing the relation of season fatality from typhoid fever in Michigan, as indicated by the per cent of cases which terminated fatally, to the total number of reported cases taken sick in the same month for each sex. This data is based on Michigan statistics for the years 1913 to 1918 combined.*

MONTHS	Total.			Males.			Females.		
	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
Total	**11,951**	**2,420**	**20.2**	**7,129**	**1,508**	**21.2**	**4,822**	**912**	**18.9**
January.......	699	181	25.9	404	112	27.7	295	69	23.4
February......	734	155	21.1	421	88	20.9	313	67	21.4
March.........	680	158	23.2	388	99	25.5	292	59	20.2
April..........	703	192	27.3	421	115	27.3	282	77	27.4
May..........	572	172	30.1	357	102	28.3	215	70	32.6
June..........	679	134	19.7	407	93	22.9	272	41	15.1
July...........	929	185	19.9	592	121	20.4	337	64	19.0
August........	1,579	249	15.1	924	155	16.8	655	94	14.4
September.....	1,895	289	15.3	1,095	190	17.4	800	99	12.4
October........	1,523	316	20.7	928	197	21.2	595	199	20.0
November.....	872	214	24.5	494	127	25.7	378	87	23.0
December......	638	175	27.4	407	109	26.8	231	66	28.6
Not stated.....	448	....	......	291	....	......	157	....	......

PNEUMONIA IN MICHIGAN IN 1918 AND PRECEDING YEARS.

GENERAL PREVALENCE.

In the following table is shown the number of cases and deaths reported to this department, together with their death rates, per 100,000 population, for each of the years 1900 to 1918, inclusive.

By reference to this general prevalence table, the great and steady increase in the death rates from this disease is very noticeable. Beginning with the year 1915 the death rate from pneumonia (all forms) has increased at an alarming rate. The per cent of increase during these later years over that of the annual average rate for the years 1910 to 1914, inclusive, is as follows: For 1915, 6.5 per cent; for 1916, 24.0 per cent; for 1917, 49.3 per cent, and for 1918, 136.2 per cent.

In the second following table, in which is shown the number of cases, deaths and the death rates per 100,000 estimated population, for each of the counties of the State, the annual average death rate for the State as a whole, for the years 1904 to 1916, was 98.5 per cent, and for the year 1917 we find the rate to be 144.2 per cent, which is an increase of 46.4 per cent, and for the year 1918 the rate has steadily increased until it has reached 228.2 per cent per 100,000 population. This great increase in the death rate from pneumonia (all forms) for this year is 129.6 per cent greater than the annual average rate for the years 1904-1916.

In comparing the death rates shown in Table 18 for the years 1917 and 1918, with that of the annual average rate for the period of from 1904 to 1916, inclusive, by geographical sections, the Upper Peninsula section of counties shows an increase in their 1918 rate of 60.8 per cent, and 6.5 per cent during 1917 over that of the annual average rate. The northern section also shows an increase in 1918 equivalent to 59.6 per cent, while for 1917 it shows a decrease of 4.5 per cent, as compared with their average rate for the years 1904 to 1916. The counties constituting the central section of the State show an increase in their 1918 and 1917 rates of 73.2 and 30.7 per cent, respectively over that of their average rate. The southern counties which contain the largest part of the population of the State, in which most of our largest cities are located, show an increase in their 1918 and 1917 rates of 182.3 and 74.0 per cent, as compared with the annual average rate for same.

In the counties constituting the Upper Peninsula section there was only one county, namely, Keweenaw, whose death rate from pneumonia showed a decrease in 1918 over that of the previous year. In the northern section of counties there were four counties that enjoyed a lower rate in 1918 than in 1917; one whose rate remained the same and six whose rate showed very little increase over that of the preceding year, thus leaving the rest of the counties, numbering 16, with excessive rates, as compared with 1917. In the group of counties composing the central section we find three whose 1918 death rate was lower than it was in 1917, and one county whose rate remained the same. The balance of the counties showed an increase in their rates. The southern section of the State, which includes most of our largest cities, shows the greatest increase in the death rate for 1918 over that of 1917 of any of the other sections. This section is made up of twenty-eight counties, three of which enjoyed a lower rate in

1918 than they did in 1917; two remained practically the same, while the rest showed an increase. Kalamazoo county, which includes "Camp Custer," and Wayne county, in which our largest city is located, were the two counties that were the principal factors causing the great increase in the death rate for this southern sections of counties. There were reported to this department 2,423 deaths from the city of Detroit and 536 deaths from Camp Custer, making a total of 2,959 deaths, or 54.1 per cent of the total number of deaths reported from the southern section.

In the following pages of this report will be found tables showing the number of deaths from Broncho pneumonia and "other forms of pneumonia" by ages and months, also the number of deaths from all forms of pneumonia in the principal cities of the State.

TABLE 18.—*Showing the prevalence of pneumonia in Michigan in each of the years 1900-1918, also the averages for five-year periods.*

Years.	Cases.	Deaths.	Deaths per 100,000 population.
1900	....	2,388	98.6
1901	....	2,901	118.4
1902	....	2,637	106.5
1903	....	2,607	104.2
1904	3,790	2,646	104.6
Average 1900-1904	....	2,636	106.3
1905	3,227	2,417	94.5
1906	3,387	2,621	101.4
1907	3,976	3,018	115.6
1908	3,177	2,313	87.6
1909	3,142	2,265	84.9
Average 1905-1909	3,382	2,527	94.2
1910	3,671	2,785	99.1
1911	3,452	2,763	96.7
1912	3,592	2,796	96.3
1913	3,687	2,894	98.1
1914	3,470	2,751	92.4
Average 1910-1914	3,574	2,798	96.6
1915	4,022	3,132	102.9
1916	4,708	3,659	119.8
1917	5,622	4,455	144.2
1918	10,130	7,143	228.2

Diagram showing the prevalence of Pneumonia (all forms) in Michigan during the years 1900 to 1918.

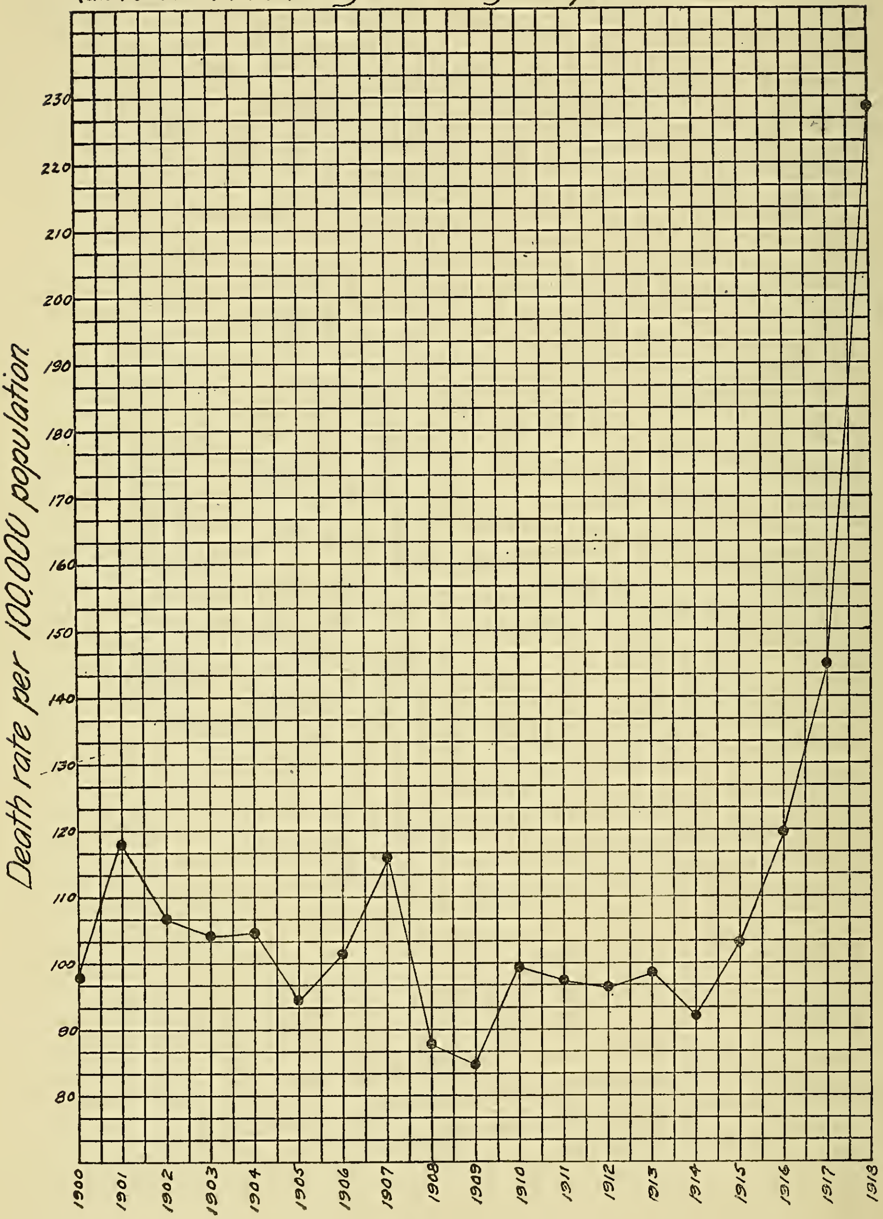


TABLE 18.—*Showing the cases, deaths and death rates per 100,000 population from pneumonia (all forms) in each of the counties of the State for the years 1918 and 1917, also the averages for the years 1904-1916, inclusive.*

State and counties by geographical sections.	1918			1917			Average 1904-1916		
	Cases.	Deaths.	Death rate per 100,000 population.	Cases.	Deaths.	Death rate per 100,000 population.	Cases.	Deaths.	Death aate per 100,000 population.
STATE	10,130	7,143	228.2	5,622	4,455	144.2	3,605	2,775	98.5
I.—Upper Peninsula	756	535	141.0	476	349	93.4	391	286	87.7
Alger	18	19	207.2	17	17	191.1	9	8	103.7
Baraga	12	12	157.2	7	7	94.0	5	5	81.1
Chippewa	59	55	203.1	29	27	100.9	28	23	93.7
Delta	71	58	164.4	67	65	187.6	38	36	119.1
Dickinson	52	31	134.7	13	6	26.5	20	14	68.0
Gogebic	88	68	135.8	37	33	117.2	22	20	85.2
Houghton	158	109	102.3	90	65	62.4	101	76	85.8
Iron	33	25	123.2	25	24	122.0	17	14	91.5
Keweenaw	11	7	67.7	12	8	80.0	12	5	68.7
Luce	16	15	309.3	9	9	189.5	6	6	149.0
Mackinac	13	12	114.0	7	6	57.8	8	6	64.6
Marquette	119	51	99.6	113	46	90.7	78	40	85.3
Menominee	46	34	138.4	25	23	93.1	24	21	81.8
Ontonagon	33	23	215.2	12	8	76.6	9	4	46.0
Schoolcraft	27	14	149.6	13	5	54.0	14	8	92.0
II.—Northern Counties	665	437	122.6	336	259	73.5	354	253	76.8
Alcona	4	4	70.0	4	4	70.0	4	3	52.5
Alpena	46	45	210.4	6	6	28.3	18	17	85.0
Antrim	21	15	100.3	7	5	33.2	16	11	70.2
Arenac	17	16	161.7	15	15	153.0	9	9	93.4
Benzie	13	11	96.2	21	9	79.4	12	9	84.5
Charlevoix	40	23	98.2	18	15	65.4	19	12	62.3
Cheboygan	55	29	147.0	24	17	86.6	19	14	78.1
Clare	12	7	70.2	6	6	60.7	9	5	54.0
Crawford	10	10	210.1	10	9	193.2	5	4	101.1
Emmet	52	29	139.8	7	6	29.3	20	14	75.7
Gladwin	9	4	40.2	18	14	143.4	6	5	60.5
Grand Traverse	26	24	90.4	23	23	87.8	24	19	79.7
Iosco	24	20	213.4	14	10	106.2	7	6	61.3
Kalkaska	8	5	56.2	16	13	147.7	6	5	62.4
Lake	7	7	142.2	7	4	81.2	5	3	60.7
Leelanau	14	6	56.3	4	2	18.8	8	7	66.0
Manistee	48	28	108.6	23	17	65.6	45	22	82.0
Mason	54	28	110.5	26	23	95.0	22	17	78.7
Missaukee	48	36	308.1	6	4	34.6	12	11	103.5
Montmorency	10	6	143.4	9	4	96.7	6	4	106.2
Ogemaw	11	7	71.0	9	9	92.4	10	9	102.1
Osceola	33	19	106.1	15	12	67.0	20	12	67.0
Oscoda	2	......	......	3	1	41.0	5	2	100.9
Otsego	12	6	87.4	5	4	58.6	6	6	92.0
Presque Isle	21	10	75.4	16	12	92.2	10	8	72.4
Roscommon	5	5	186.6	1	1	38.0	4	2	89.5
Wexford	63	37	154.0	23	14	59.2	27	17	81.5
III.—Central Counties	963	699	148.6	657	524	112.1	489	392	85.8
Bay	165	133	181.9	90	76	104.8	73	65	95.9
Gratiot	84	49	175.8	27	19	67.8	34	24	83.3
Huron	56	48	136.1	32	30	85.2	33	27	77.8
Isabella	59	29	124.8	33	23	99.1	34	19	82.5
Mecosta	53	14	75.9	29	20	107.7	22	15	76.7
Midland	34	30	220.0	15	14	102.3	16	13	92.6
Montcalm	63	52	165.0	32	28	88.7	30	25	77.8
Muskegon	134	113	259.7	95	75	173.8	52	43	105.8
Newaygo	41	27	131.6	24	23	113.0	17	12	62.3
Oceana	18	10	49.9	20	16	81.0	22	16	87.3
Saginaw	167	133	138.5	170	127	134.5	88	70	78.3
Sanilac	33	23	69.7	40	29	87.6	30	24	70.8
Tuscola	56	38	111.4	50	44	128.7	38	29	82.9

TABLE 18—*Concluded.*

State and counties by geographical sections.	1918			1917			Average 1904-1916		
	Cases.	Delths.	Death rate per 100,000 population.	Cases.	Deaths.	Death rate per 100,000 population.	Cases.	Deaths.	Death rate per 100,000 population.
IV.—Southern Counties	**7,746**	**5,474**	**284.3**	**41,53**	**3,323**	**175.2**	**2,371**	**1,844**	**100.7**
Allegan	74	35	86.1	52	35	86.3	44	30	75.3
Barry	50	17	74.8	32	19	83.6	23	15	66.4
Berrien	193	115	203.2	125	76	134.9	49	34	63.3
Branch	63	44	185.1	30	20	83.3	22	14	54.7
Calhoun	216	118	188.2	109	61	98.5	85	48	84.5
Cass	34	22	107.8	33	28	132.1	21	16	77.6
Clinton	83	49	228.3	46	27	124.6	29	18	77.6
Eaton	64	33	111.8	41	28	94.4	36	25	81.9
Genesee	405	209	250.4	260	116	145.9	93	60	92.2
Hillsdale	83	42	142.3	44	33	115.1	30	22	74.1
Ingham	234	112	182.0	110	62	101.4	60	37	69.0
Ionia	54	32	97.2	31	23	70.0	38	28	83.6
Jackson	185	143	247.5	101	76	132.8	82	45	84.1
Kalamazoo	912	679	919.8	144	90	124.9	115	61	103.2
Kent	774	272	148.6	287	162	90.4	199	139	87.0
Lapeer	106	35	141.7	93	42	168.9	49	30	115.4
Lenawee	165	94	197.9	55	42	90.4	53	40	83.5
Livingston	29	17	105.4	24	15	91.9	24	15	84.3
Macomb	93	39	122.8	28	21	65.8	36	28	85.2
Monroe	71	53	160.4	40	30	90.8	40	32	97.2
Oakland	249	126	236.0	142	89	169.9	71	51	102.7
Ottawa	96	63	126.0	36	30	60.7	48	29	64.1
St. Clair	83	55	110.1	51	46	91.6	60	45	86.1
St. Joseph	80	39	145.3	43	33	100.6	22	21	82.2
Shiawasee	90	58	177.7	40	29	87.3	34	22	66.0
Van Buren	73	50	151.0	33	27	81.5	38	26	78.2
Washtenaw	128	98	232.3	73	62	145.9	55	41	91.8
Wayne	3,059	2,825	412.8	2,050	2,001	300.2	949	894	167.4

PNEUMONIA IN CITIES OF MICHIGAN OF 10,000 POPULATION AND OVER.

In the following table can be found the number of cases and deaths as reported to this department, also the death rates per 100,000 estimated population, for each of the named cities during the years 1905 to 1918, inclusive. The total number of cases and deaths, also the death rates, are shown for all cities combined.

The data shown in this table has been divided into two seven-year periods, namely, 1905-1911 and 1912-1918. This idea is carried out for each of the cities mentioned, as well as for the total for all cities combined.

The annual average death rate, per 100,000 estimated population, for all cities shown in this table for the years 1905-1911 was 112.1 per cent. The cities experiencing rates that were higher than that of the average (112.1) were, together with their rates: Detroit, 160.3 per cent; Pontiac, 152.5; Kalamazoo, 134.1; Escanaba, 133.0; Ishpeming, 129.6; Muskegon, 126.8; Sault Ste. Marie, 119.9; Menominee, 118.0, and Port Huron, 112.4, while the balance of the cities enjoyed a rate that is considerably less than that of the average. The city of Lansing enjoyed the lowest rate of any of the cities given in this table for the years 1905-1911, Lansing's rate being 72.8 per cent per 100,000 population, which is 35 per cent less than the annual average rate for all cities combined for this period of years.

In considering the data for the second period of years, or the years from 1912 to 1918, inclusive, we find that the annual average rate for all cities combined is 178.8 per cent per 100,000 estimated population, this rate (178.8) being 59.4 per cent greater than that of the annual average rate for the years 1905-1911. The cities, together with their rates, that had an annual rate higher than that for all cities combined for this period of years were Detroit (245.5), Ann Arbor (185.8), Pontiac (185.4) and Escanaba (194.0), while the majority of the cities shown in this table enjoyed a rate lower than that for all cities combined during this period of years, the rate for the city of Detroit being 37.4 per cent greater than that of the average annual rate for all cities. This extremely high rate for Detroit is largely responsible for the high rate for all cities combined. However, it might be well to mention at this time that the estimated population for the city of Detroit is far below the actual number of people residing in that city.

In comparing the data, as shown in the following table, by periods, it will be noticed that the average annual death rate from this disease has increased during the last seven years over that of the seven years previous by 59.4 per cent. In the column captioned "per cent increase and decrease between the two periods," is shown the per cent of increase or decrease for each of the cities shown in this table during this later period over that of the first seven years shown. Of the twenty-three cities named, fifteen show an increase during the last seven years. This increase ranges from 2.4 to 91.5 per cent. During the years 1917 and 1918 the rate for all cities combined was 201.9 and 299.3 per cent per 100,000 population. These two years are largely responsible for the high average for the last seven-year period.

In studying this table, as well as the rest of the tables on this disease, for the year 1918 it would be well to study them in conjunction with the tables pertaining to influenza, which are shown in this report. It will be noticed that practically all the cities show a great increase in their rates for 1918 as compared with those for the previous year. However, this increase is not confined to the cities of the State, but to the rural districts as well.

TABLE 19.—*Showing the reported cases, deaths and death rates per 100.000 popula*
estimated population in 1910 of 10,000 or over

		1905	1906	1907	1908	1909	1910	1911
CITIES (total)	**Cases....**	**1,066**	**1,333**	**1,501**	**1,280**	**1,298**	**1,707**	**1,565**
	Deaths..	**978**	**1,226**	**1,343**	**1,106**	**1,177**	**1,534**	**1,410**
	Rates....	**100.5**	**118.8**	**124.7**	**99.0**	**102.6**	**127.8**	**112.8**
Adrian........	Cases....	10	12	7	8	14	11	13
	Deaths...	10	13	7	8	14	11	13
	Rates....	93.5	121.4	65.3	74.5	130.2	102.2	120.6
Alpena........	Cases....	7	11	20	11	7	15	12
	Deaths...	7	11	20	11	7	15	12
	Rates....	56.2	88.0	159.2	87.2	55.3	118.1	94.0
Ann Arbor.....	Cases....	15	22	21	16	15	29	21
	Deaths...	15	16	11	8	9	23	18
	Rates....	102.6	109.0	74.8	54.3	60.9	155.2	121.1
Battle Creek...	Cases....	20	24	42	26	33	24	15
	Deaths...	20	24	39	26	33	23	13
	Rates....	88.3	103.0	163.8	106.8	132.8	91.0	50.2
Bay City......	Cases....	36	53	68	54	33	58	51
	Deaths...	33	53	68	53	33	56	48
	Rates....	79.6	125.5	158.1	121.5	74.1	124.0	104.1
Detroit........	Cases....	437	733	689	587	726	885	748
	Deaths...	427	710	717	590	720	874	768
	Rates....	125.5	186.3	176.0	137.7	160.3	187.6	155.8
Escanaba......	Cases....	20	21	16	27	7	14	13
	Deaths...	19	21	16	27	6	15	13
	Rates....	165.5	177.4	131.2	215.1	46.5	113.7	95.4
Flint..........	Cases....	24	20	26	17	34	66	57
	Deaths...	23	19	27	17	33	58	36
	Rates....	119.6	81.6	98.9	54.3	93.3	150.5	82.9
Grand Rapids..	Cases....	109	108	110	87	84	106	175
	Deaths...	106	108	113	87	78	106	144
	Rates....	107.3	106.2	108.1	81.0	70.7	94.2	124.1
Ironwood......	Cases....	10	5	4	10	7	13	8
	Deaths...	10	5	4	10	7	13	8
	Rates....	94.9	45.4	34.8	83.6	56.3	101.4	59.7
Ispheming.....	Cases....	18	14	42	43	29	28	13
	Deaths...	11	10	21	24	16	18	11
	Rates....	93.4	83.9	174.2	196.8	129.7	144.6	87.2
Jackson........	Cases....	37	44	88	57	48	52	34
	Deaths...	24	25	36	26	19	25	24
	Rates....	90.8	91.0	126.2	87.9	62.8	79.5	73.4
Kalamazoo.....	Cases....	70	72	128	72	59	109	107
	Deaths...	45	40	54	32	34	58	67
	Rates....	142.6	120.5	155.0	87.7	89.2	147.1	161.8
Lansing.......	Cases....	26	19	21	21	18	42	28
	Deaths...	23	17	19	15	13	35	20
	Rates....	103.2	70.4	73.0	53.8	43.7	112.1	59.7
Manistee......	Cases....	20	18	22	74	24	31	23
	Deaths...	17	14	7	13	12	9	8
	Rates....	134.4	111.2	55.8	104.2	96.6	72.7	65.0
Marquette.....	Cases....	10	11	11	11	7	11	20
	Deaths...	10	9	9	11	7	9	20
	Rates....	92.4	82.1	81.0	97.8	61.5	78.2	171.3

tion from pneumonia (all forms) in each of the cities of Michigan, having ... inhabitants, during the years 1905-1918, inclusive.

Total cases and deaths and annual average death rate 1905-1911.	1912	1913	1914	1915	1916	1917	1918	Total cases and deaths and annual average death rate 1912-1918.	Per cent increase (+) or decrease (—) between the two periods, 1905-1911 and 1912-1918.
9,750 8,774 112.1	1,789 1,507 117.9	1,920 1,694 129.9	1,701 1,451 109.1	2,047 1,664 140.0	2,551 2,092 171.9	3,018 2,515 201.9	5,032 3,816 299.3	18,090 14,742 178.7	+59.4
75 76 102.4	13 13 118.1	10 9 80.9	8 8 71.2	9 9 79.3	14 14 122.2	9 9 77.8	21 21 180.1	84 83 104.9	+2.4
83 83 94.4	13 12 93.0	10 10 77.0	29 20 152.8	9 9 68.3	5 4 30.1	4 4 29.9	36 35 259.6	106 94 99.4	+5.3
139 100 97.0	47 31 208.5	23 26 173.6	25 7 46.8	35 24 160.2	40 30 199.9	37 28 186.2	67 50 331.7	274 196 185.8	+91.5
184 178 104.4	23 23 85	21 19 69.2	25 22 78.2	32 23 80.0	33 29 98.3	41 28 92.7	123 63 203.9	298 207 95.8	−8.2
353 344 112.1	46 46 99.7	60 60 128.8	47 45 95.6	60 55 115.8	50 43 89.7	69 56 115.7	122 101 206.8	454 406 118.7	+5.9
4.805 4,806 160.3	988 963 191.3	1,136 1,131 217.3	945 918 170.7	1,069 1,036 186.7	1,349 1,392 243.4	1,671 1,673 283.8	2,423 2,423 4.001	9,583 9,536 245.5	+53.2
118 117 133.0	23 23 164.2	36 35 243.4	19 16 108.5	26 28 185.3	31 29 186.1	35 35 218.0	49 38 230.0	219 204 194.0	+45.8
244 213 97.0	85 45 101.5	81 45 95.9	79 38 76.7	91 38 72.9	149 72 131.6	227 90 156.9	326 155 258.3	1,038 483 132.3	+36.4
779 742 98.7	131 61 51.7	148 82 67.9	157 93 75.5	211 120 95.4	283 92 71.7	238 120 92.5	678 211 158.2	1.846 780 88.6	−10.2
57 57 67.7	8 8 59.2	6 6 43.4	11 11 77.8	10 10 69.1	33 23 157.8	16 13 88.5	28 26 175.5	112 97 96.8	+43.0
187 111 129.6	16 8 65.2	33 14 114.9	28 14 115.6	40 9 74.8	37 16 134.0	23 14 118.1	28 12 111.3	205 87 103.1	−20.4
360 179 86.6	34 34 103.6	26 26 77.7	24 24 70.6	59 31 89.3	53 47 132.9	55 46 127.8	109 103 281.2	360 311 127.8	+47.6
617 330 134.1	103 60 142.5	106 61 137.6	76 57 124.3	91 52 109.5	95 40 81.8	126 75 148.8	318 118 227.3	915 463 130.9	−2.4
175 142 72.8	43 26 75.3	36 24 66.6	32 17 45.3	49 29 74.4	64 37 91.4	89 49 11.7	175 90 207.0	488 272 100.0	+37.4
212 80 91.3	22 4 33.4	18 3 25.5	18 12 103.6	8 6 52.7	7 7 62.5	9 7 63.6	13 8 73.9	95 47 58.8	−35.6
81 75 95.1	18 18 152.2	19 15 125.3	17 11 90.8	35 10 81.5	64 11 88.6	66 18 143.5	45 20 157.7	264 103 119.9	+26.1

TABLE 10.—

		1905	1906	1907	1908	1909	1910	1911
Menominee....	Cases....	9	14	14	16	12	11	18
	Deaths...	9	14	14	16	12	10	13
	Rates....	81.8	128.6	129.8	149.7	113.3	95.2	125.2
Muskegon.....	Cases....	41	37	35	16	26	32	38
	Deaths...	36	32	34	16	26	32	36
	Rates....	167.5	145.3	150.7	69.3	110.0	133.0	145.7
Pontiac........	Cases....	25	12	14	15	22	70	34
	Deaths...	22	12	12	15	17	49	18
	Rates....	183.9	96.0	92.1	110.5	120.5	336.5	118.6
Port Huron....	Cases....	35	13	23	25	15	21	30
	Deaths...	32	13	22	25	15	21	23
	Rates....	161.5	66.3	113.3	130.1	78.9	144.2	123.5
Saginaw.......	Cases....	44	43	70	52	50	46	73
	Deaths...	44	42	69	52	48	46	70
	Rates....	94.4	87.5	141.8	105.4	96.0	91.1	136.4
Sault Ste. Marie	Cases....	24	14	18	14	18	19	22
	Deaths...	20	14	15	11	9	17	17
	Rates....	171.6	118.1	124.4	89.8	72.3	134.8	132.2
Traverse City..	Cases....	19	13	12	21	10	14	12
	Deaths...	15	4	9	13	9	11	10
	Rates....	131.6	34.6	76.9	109.7	75.0	90.8	81.3

Continued.

Total cases and deaths and annual average death rate 1905-1911.	1912	1913	1914	1915	1916	1917	1918	Total cases and deaths and annual average death rate 1912-1918.	Per cent increase (+) or decrease (−) between the two periods, 1905-1911 and 1912-1918.
94	11	10	8	9	10	12	20	80	
88	11	10	6	9	10	12	17	75	
118.0	111.1	102.5	65.1	96.9	110.4	136.1	198.0	115.2	−2.4
225	26	21	27	49	78	68	104	373	
212	26	21	21	44	66	51	92	321	
126.8	104.9	83.6	82.5	170.7	252.8	192.8	343.4	178.5	+40.7
192	51	30	32	36	41	79	158	427	
145	18	14	23	22	31	48	65	221	
152.5	115.4	87.1	138.9	129.1	176.7	266.7	351.7	185.4	+21.6
162	17	17	22	30	27	22	19	154	
151	13	15	22	20	20	22	19	131	
112.4	63.8	79.9	117.4	107.5	107.1	118.0	102.1	100.0	−11.0
378	50	49	49	60	63	121	111	503	
371	46	44	44	53	53	88	93	421	
107.5	87.9	82.8	81.5	96.7	95.3	155.9	162.3	115.0	+7.0
129	11	18	16	12	18	19	39	133	
103	9	18	16	11	19	19	36	128	
119.9	68.8	135.6	118.5	80.2	136.5	134.5	251.1	133.5	+11.3
101	10	6	7	17	7	12	20	79	
71	9	6	6	16	7	12	20	76	
85.3	70.8	46.2	45.2	118.2	50.7	85.2	139.4	80.5	−5.6

SEASONAL PREVALENCE OF PNEUMONIA.

In Table 20 is shown the number of deaths from Broncho and "other forms" of pneumonia occurring during each month of the years 1918, 1917 and 1916, also the average number of deaths occurring in each of the months during the years 1898-1915, inclusive. The per cent of deaths occurring in each of the months, to the average monthly number (which we have let equal 100 per cent) is also shown for each of the months during the years given in this table.

As indicated by the data shown in the following table, Broncho pneumonia on the average, is more prevalent during the months of from December to May, and less prevalent during the summer and early fall months. For the year 1918 this disease reached its greatest prevalency during the month of October. However, during this month there were reported to this department 453 deaths from Broncho pneumonia occurring in Charleston Township, Kalamazoo County, and practically all of the 453 deaths were from Camp Custer.

For "other forms" of pneumonia, the months in which the greatest and least prevalency is shown are the same as for Broncho pneumonia. The month of October for "other forms" of pneumonia was 281.2 per cent greater than the average number of monthly deaths for the year 1918, while for 1917 it was only 66 per cent of the average monthly number, and in 1916 it was 59 per cent, or 41 per cent below the average.

TABLE 20.—*Showing the seasonal prevalence of broncho and other forms of pneumonia in Michigan, as indicated by the number of deaths from the two forms of this disease, during each of the months during the years 1918, 1917 and 1916, also the average number of deaths occurring in each of the months during the years 1898-1915. Letting the average number of monthly deaths equal 100 per cent, in the column captioned "per cent above or below the average," a comparison of any one month can be made with another or with the average (100 per cent).*

Months.	1918.				1917.			
	Broncho.		Other Forms.		Broncho.		Other Forms.	
	The number of deaths occurring in each month during the year 1918.	Per cent above or below the average.	The number of deaths occurring in each month during the year 1918.	Per cent above or below the average.	The number of deaths occurring in each month during the year 1917.	Per cent above or below the average.	The number of deaths occurring in each month during the year 1917.	Per cent above or below the average.
January	179	91.8	331	80.4	251	202.1	471	184.9
February	161	90.8	305	82.1	221	197.2	387	166.9
March	181	92.8	333	80.9	182	146.2	439	172.4
April	235	124.6	670	168.2	149	124.6	350	142.2
May	139	71.3	262	63.7	132	106.8	301	118.2
June	49	26.2	113	28.4	60	50.2	154	62.4
July	31	15.9	73	17.7	65	52.6	94	36.9
August	37	19.0	44	10.7	23	18.6	66	25.9
September	58	30.8	82	20.7	70	58.3	92	35.9
October	696	356.9	1,157	281.2	77	62.3	166	66.0
November	237	125.6	747	187.6	90	75.2	201	81.7
December	295	151.3	728	176.9	135	108.2	279	109.1
Total	2,298	100.0	4,845	100.0	1,455	100.0	3,000	100.0

TABLE 20—*Continued.*

Months.	1916.				Average 1898-1915.			
	Broncho.		Other Forms.		Broncho.		Other Forms.	
	The number of deaths occurring in each month during the year 1916.	Per cent above or below the average.	The number of deaths occurring in each month during the year 1916.	Per cent above or below the average.	Average number of deaths occurring in each month during the years 1898-1915.	Per cent above or below the average.	Average number of deaths occurring in each month during the years 1898-1915.	Per cent above or below the average.
January	165	144.7	394	200.4	78	150.0	274	158.4
February	148	142.8	265	149.0	84	178.8	301	192.5
March	162	142.1	308	156.7	96	184.6	310	179.2
April	145	131.6	260	136.8	75	142.3	255	152.0
May	135	117.4	208	105.8	53	101.9	187	108.1
June	75	67.6	116	61.0	32	67.3	96	57.2
July	49	42.0	60	30.5	17	32.7	54	31.2
August	34	29.8	47	23.9	18	34.6	45	26.0
September	55	50.0	75	39.2	21	42.3	59	35.3
October	98	85.0	116	59.0	31	59.6	93	54.8
November	106	95.5	160	83.9	44	86.5	139	82.7
December	172	150.9	306	155.6	62	119.2	212	123.5
Total	1,344	100.0	2,315	100.0	611	100.0	2,025	100.0

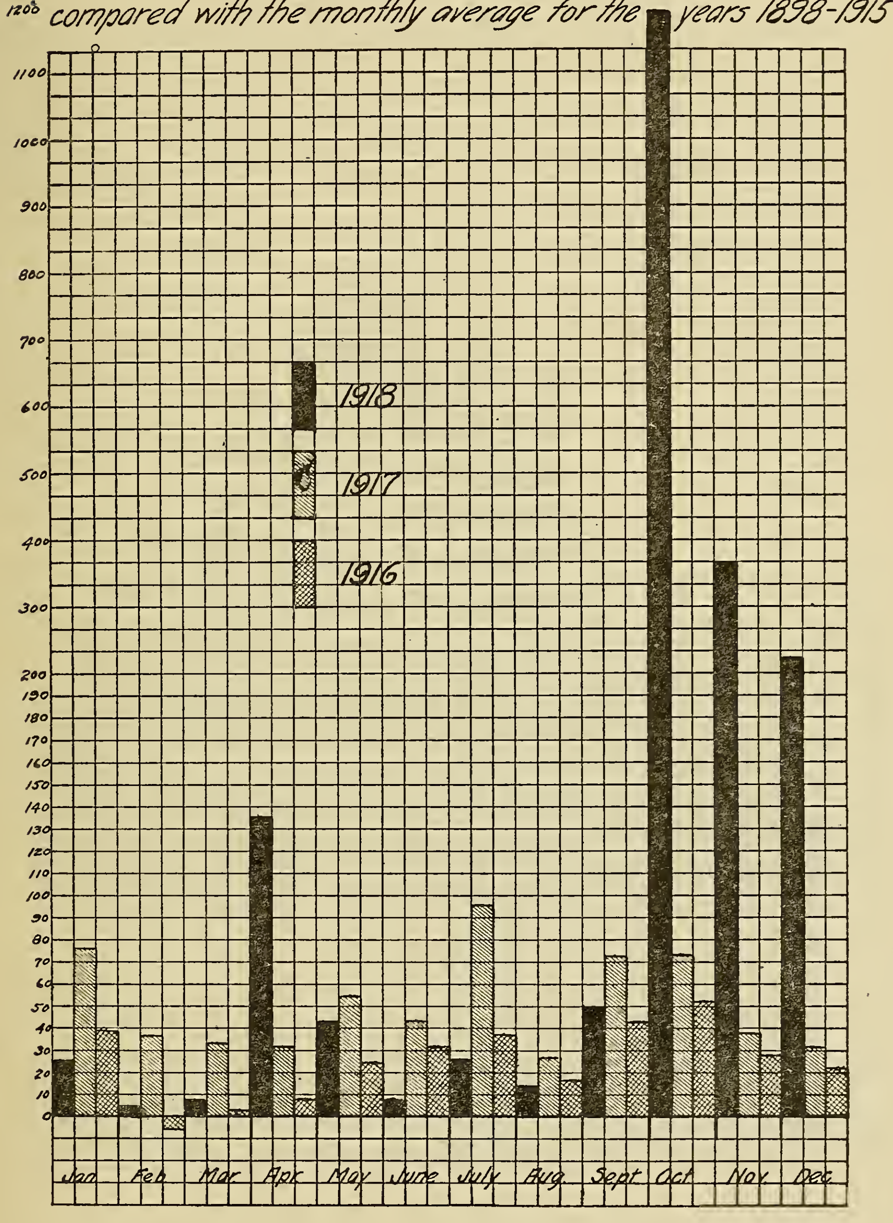
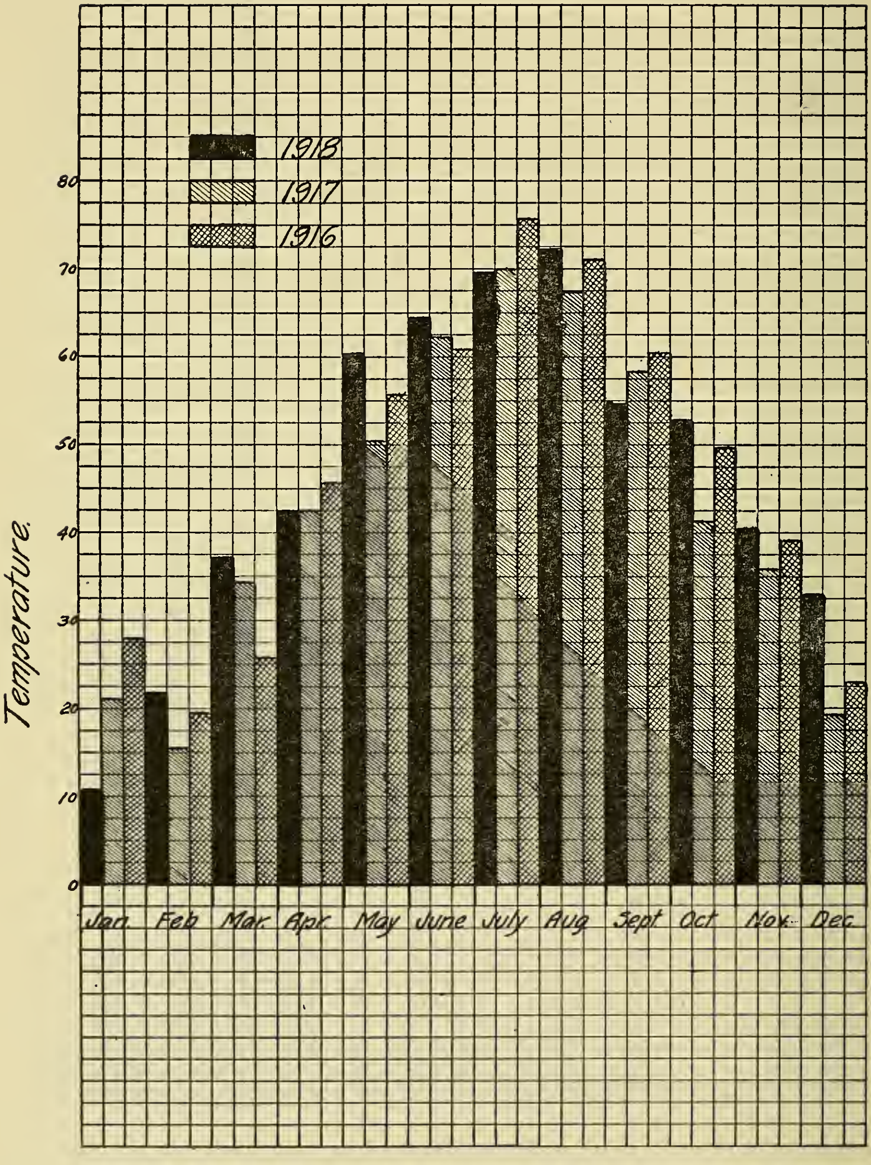
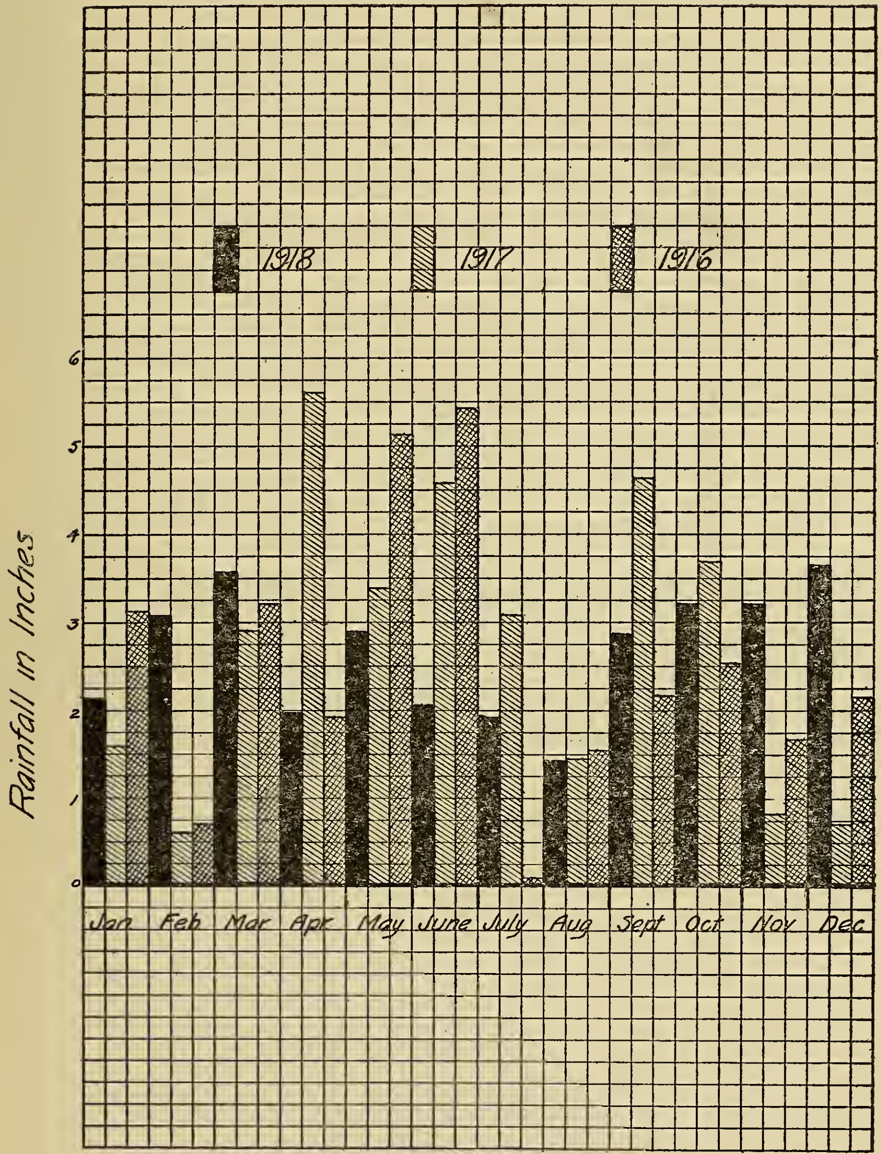


Diagram showing the per cent of increase in the death rates, per 100,000 population, by months, for 1916, -17, -18 as compared with the monthly average for the years 1898-1915



Average Monthly Temperature.

Average Monthly Precipitation



AGE DISTRIBUTION OF PNEUMONIA.

As will be seen by the data shown in the following table, Broncho pneumonia during the year 1918 shows a great increase in its death rate, per 100,000 population, over 1917 and 1916, and also over that of the average for the years 1898-1915. Broncho pneumonia is a disease affecting children under 5 years of age and those of old age. This theory holds true, for the years shown in this table, with possibly the exception of 1918. For those whose ages ranged from 20 to 29 years, it will be noticed that during 1918 there were reported of this department 582 deaths from Broncho pneumonia whose ages were in the twenties. The explanation of this great increase in the number of deaths during these ages is: Of the 582 deaths of those whose ages were 20 to 29 years there were 451 of these reported to this department from Camp Custer. If these deaths could be eliminated, the above statement that Broncho pneumonia was a disease affecting childhood and old age more than any of the other ages, would still be true for 1918, as well as for the other years shown. It might be well to state at this time that a large per cent of the pneumonia deaths that occurred at Camp Custer during the fall of 1918 were due to Broncho pneumonia, which is a disease that was not supposed to be prevalent among those of the middle ages of life. However, the increase in the death rate from Broncho pneumonia shows an increase in nearly every age group during 1918 over their respective rates for the previous years.

Lobar and undefined, or in other words, "other forms" of pneumonia, takes its greatest toll among those of the middle ages, or the time when a person is in the prime of life. At each of the age groups of from 5 to 60 years the rates for 1918 are the highest of any of the years shown in this table. The maximum increase during 1918 over that of 1917 occurred at the age group of 10-19 and 20-29 years, and each of these age groups compared with the corresponding age for the year 1916 and with that for the average of 1898-1915. It will be noticed that the age group of from 20 to 29 years shows the greatest increase of any of the age groups.

TABLE 21.—*Showing the age distribution of the fatal cases of broncho and other forms of pneumonia, in Michigan, as indicated by the number of deaths occurring at each age group during the years 1918, 1917 and 1916, also the average number of deaths occurring at each age group during the years 1898 to1915 inclusive. The death rate per 100,000 population, of the respective age groups, for both forms of pneumonia and for each of the years is also shown.*

	1918.				1917.			
	Broncho.		Other Forms.		Broncho.		Other Forms.	
	The total number of deaths during the year 1918.	Death rates per 100,000 population.	The total number of deaths during the year 1918.	Death rates per 100,000 population.	The total number of deaths during the year 1917.	Death rates per 100,000 population.	The total number of deaths during the year 1917.	Death rates per 100,000 population.
ALL AGES	2,298	73.4	4,845	154.7	1,455	47.1	3,000	97.1
Under 1 year	615	899.7	352	514.9	593	877.6	434	642.3
Under 5 years	974	295.1	691	209.4	905	277.4	703	215.5
5– 9 years	71	24.2	120	42.1	30	10.6	55	19.5
10–19 years	63	11.2	377	67.0	18	3.2	83	14.9
20–29 years	582	101.2	1,094	190.2	31	5.5	227	40.6
30–39 years	185	41.0	972	215.5	35	7.9	386	86.7
40–49 years	68	18.9	446	124.1	47	13.2	333	93.6
50–59 years	53	19.0	345	123.4	57	15.2	348	92.9
60–69 years	74	42.0	323	183.2	85	49.1	376	216.7
70–79 years	140	166.4	280	332.8	136	160.5	308	373.2
80 years and over	75	329.6	149	654.7	104	466.0	152	681.0
Unknown ages	13	....	48	....	7	....	29	....

TABLE 21.—(Continued.)

	1916.				Average 1898-1915.			
	Broncho.		Other Forms.		Broncho.		Other Forms.	
	The total number of deaths during the year 1916	Death rates per 100,000 populat on	The total number of deaths during the year 1916	Death rates per 100,000 population	Average number of deaths during the years 1898-1915	Death rates per 100,000 population	Average number of deaths the years 1898-1915	Death rates per 100,000 population
ALL AGES	1.344	44.0	2,315	75.8	611	23.6	2,025	77.0
Under 1 year	551	822.4	313	467.2	270	451.3	390	663.4
Under 5 years	900	279.2	503	155.7	411	142.0	585	195.6
5 –9 years	26	9.2	37	13.1	16	5.8	51	19.0
10–19 years	18	3.3	103	18.6	8	1.6	91	18.5
20–29 years	33	5.9	190	34.1	9	2.1	135	29.5
30–39 years	31	7.1	225	50.9	13	3.5	152	40.0
40–49 years	35	9.9	242	68.7	12	4.0	177	58.4
50–59 years	41	15.2	293	108.5	20	9.0	195	89.2
60–69 years	91	53.5	304	178.8	37	26.0	243	176.3
70–79 years	94	116.0	297	366.7	51	78.0	252	389.3
80 years and over	74	336.4	113	513.6	33	186.5	131	767.1
Unknown ages	1	....	8	....	00.3	....	3	....

INFLUENZA IN MICHIGAN. GENERAL PREVALENCE.

The pandemic of influenza which swept across the United States in the fall of 1918 was first recognized in a United States Naval Hospital at Chelsea, Mass., on August 28, 1918. Between August 28 and September 11 there were more than 2,000 cases reported from this district. This epidemic spread from East to West and first manifested itself in Michigan during the last few days in September, 1918; the first reports of this disease reached this department on the first day of October, 1918. On this day there were thirteen cases reported; these cases were reported from the southern counties of the State; six of the thirteen cases were reported from Calhoun County. On October 2 there were 121 cases reported to this department and 90 of these came from Jackson County. During the first three weeks of this epidemic there were more cases reported from Jackson County than from any of the other counties in the State.

Within two or three weeks from the time that the first report was received at this office nearly every county in the state was reporting cases of influenza. The number of reported cases increased daily until on October 23, there were 4,664 new cases reported to this department; this was the largest number of cases reported in any one day during the epidemic. From October 23 to November 14 the number of cases reported daily gradually decreased until on November 14 there were only 604 cases reported. For the week ending October 26th there were 21,205 cases reported; it was during this week that this disease reached its greatest prevalence.

On October 18th Dr. R. M. Olin, Secretary of Michigan State Board of Health, issued an order closing churches, dance halls, poolrooms and all places of amusements, and prohibiting public funerals or public gatherings of any kind. This "ban" remained in force for nearly three weeks and was lifted on November 7th. The effect of this closing order can be seen by referring to the diagram in which is shown the number of cases of this disease reported daily to this department during the months of October, November and December.

In the following pages of this report is given tables showing the number of cases and deaths as reported weekly to this department for the State as a whole, and for each of the counties constituting same. During the months October, November and December, 1918, there were reported to the State Board of Health 116,302 cases of influenza and 6,745 deaths resulting from this disease. Following the above mentioned tables will be found tables showing the number of cases and deaths by sex for each of the three months, also by age groups and by sex for each of the various age groups given for each of the months and for the total of the three months. The per cent of cases and deaths to the total number, by age groups, will also be found in the following tables.

TABLE 22.—*Showing the prevalence of influenza as reported to the Michigan State Board of Health, for the months of October, November and December, 1918. This table shows the number of cases reported (by weeks) of this disease for the State as a whole and for each of the counties.*

	Total for week ending Oct. 5.	Total for week ending Oct. 12.	Total for week ending Oct. 19.	Total for week ending Oct. 26.	Total for week ending Nov. 2.	Total for week ending Nov. 9.	Total for week ending Nov. 16.	Total for week ending Nov. 23.	Total for week ending Nov. 30.	Total for week ending Dec. 7.	Total for week ending Dec. 14.	Total for week ending Dec. 21.	Total for week ending Dec. 28.	Total for two days Dec. 30-31.	Total cases reported during Oct. Nov. and Dec. 1918.
STATE	496	3,021	9,366	21,205	13,475	7,575	4,531	5,271	5,637	8,688	11,304	12,825	8,796	4,112	116,302
Counties:															
Alcona	1	14	32	12	11	6	1	5	......	3	2	33	......	......	120
Alger	......	......	7	2	15	8	22	......	......	1	7	12	20	21	115
Allegan	1	75	157	372	145	79	71	96	67	120	183	235	185	20	1,806
Alpena	......	......	3	238	73	14	2	10	1	2	8	21	......	......	372
Antrim	......	1	38	31	145	1	200	......	......	......	1	2	4	1	424
Arenac	5	......	......	29	20	10	5	67	......	4	15	49	54	25	283
Baraga	4	......	10	63	......	......	10	1	......	26	8	......	8	......	130
Barry	......	29	100	78	102	158	39	76	39	240	310	254	175	41	1,640
Bay	6	2	91	477	579	483	611	633	443	457	359	213	211	34	4,599
Benzie	......	6	32	35	43	6	4	6	......	20	128	83	6	8	377
Berrien	7	145	272	872	205	97	116	38	82	135	136	246	109	62	2,522
Branch	......	2	70	71	428	37	2	87	4	11	61	75	76	30	954
Calhoun	63	411	624	694	289	81	222	89	39	378	564	266	219	53	3,992
Cass	......	......	32	9	1	3	......	......	26	......	87	103	29	12	302
Charlevoix	......	2	104	353	97	42	22	15	12	19	36	14	16	10	742
Cheboygan	......	28	37	146	83	94	17	14	5	212	8	21	16	2	683
Chippewa	7	14	23	201	339	295	29	52	19	58	50	51	55	4	1,197
Clare	......	......	1	30	27	17	27	26	22	15	31	65	31	4	296
Clinton	......	16	61	44	63	24	23	72	28	258	215	370	144	51	1,369
Crawford	3	7	9	15	78	21	25	......	......	27	9	55	133	63	445
Delta	......	4	6	195	113	90	4	45	78	91	12	5	38	......	681
Dickinson	......	......	......	4	1	15	2	15	19	34	29	185	......	222	526
Eaton	9	38	264	223	82	29	12	45	66	88	103	152	115	44	1,270
Emmet	31	......	140	255	52	74	14	4	9	49	11	165	37	24	865
Genesee	13	89	463	1,732	201	17	73	84	113	89	87	160	133	29	3,283
Gladwin	......	......	8	34	57	62	23	45	31	24	12	75	64	3	448
Gogebic	2	1	10	190	83	271	40	101	223	660	341	12	22	27	1,983
Grand Traverse	......	......	6	12	6	3	15	5	2	14	26	206	40	28	363
Gratiot	1	7	31	132	111	19	30	82	59	59	95	132	90	85	933
Hillsdale	1	15	46	102	167	10	4	5	13	61	96	239	44	27	830
Houghton	......	19	65	89	122	260	31	61	70	100	155	186	235	167	1,560
Huron	......	24	21	73	100	149	326	183	124	96	148	69	42	11	1,366
Ingham	8	217	572	560	199	159	80	78	82	146	287	319	174	270	3,151

Ionia	5	30	199	303	123	66	81	59	87	194	289	390	182	64	2,072
Iosco	10	22	8	5	17	26	......	......	......	4	......	79	11	6	188
Iron	......	......	1	2	......	16	1	2	1	......	91	66	185	1	366
Isabella	......	5	10	145	136	70	43	57	36	29	272	235	173	75	1,286
Jackson	226	693	1,594	936	314	73	129	91	49	134	270	130	181	135	4,955
Kalamazoo	1	113	640	928	468	176	183	184	233	338	791	569	73	12	4,709
Kalkaska	......	2	2	5	6	101	......	......	......	1	5	1	......	......	123
Kent	......	91	260	519	428	276	84	386	634	677	641	1,132	761	285	6,174
Keweenaw	......	......	......	......	......	......	1	......	3	......	......	58	40	15	117
Lake	......	10	......	1	2	14	5	16	......	11	6	1	44	7	117
Lapeer	1	102	83	254	121	41	17	4	14	12	33	79	59	48	868
Leelanau	......	......	5	11	17	12	5	19	54	95	65	20	109	11	423
Lenawee	5	135	348	501	397	135	74	60	64	142	255	265	263	62	2,706
Livingston	......	10	10	35	8	8	2	16	13	43	48	61	49	27	330
Luce	......	50	......	12	165	131	27	21	......	......	15	10	21	2	454
Mackinac	......	8	12	12	26	54	8	......	......	......	12	21	28	11	192
Macomb	8	12	134	276	67	40	13	100	46	43	48	70	25	11	893
Manistee	......	......	17	45	57	30	28	37	78	129	134	98	146	87	886
Marquette	......	1	28	83	53	155	76	123	87	254	90	122	136	77	1,285
Mason	6	2	27	15	2	1	......	......	4	2	65	81	13	20	238
Mecosta	1	10	36	249	76	52	76	69	89	101	85	253	185	179	1,461
Menominee	9	14	5	24	21	47	13	15	69	142	154	175	59	7	754
Midland	......	6	16	16	12	27	17	16	18	21	30	26	20	2	227
Missaukee	......	7	5	......	5	......	......	......	......	......	1	16	46	434	514
Monroe	2	33	115	520	271	92	10	27	34	91	75	117	53	8	1,448
Montcalm	5	63	90	90	13	20	9	36	78	96	169	124	120	13	926
Montmorency	4	13	66	277	233	216	114	126	70	154	192	257	203	51	1,976
Muskegon	......	......	3	12	28	......	4	......	10	1	3	5	1	......	67
Newaygo	1	25	18	22	46	21	7	26	28	38	36	18	17	2	305
Oakland	2	18	429	731	225	249	290	313	353	419	275	206	95	59	3,664
Oceana	4	65	68	70	70	19	5	29	12	24	65	212	198	63	904
Ogemaw	......	......	1	27	32	21	10	13	1	6	22	22	12	19	186
Ontonagon	......	......	......	32	15	98	13	9	......	19	31	19	1	2	239
Osceola	......	......	8	31	15	68	33	65	59	15	52	92	28	5	471
Oscoda	......	......	......	......	......	......	......	......	......	......	......	23	3	......	26
Otsego	......	......	......	36	11	......	......	......	......	......	......	9	1	......	57
Ottawa	......	14	49	86	76	392	140	150	135	138	212	333	115	25	1,855
Presque Isle	......	......	9	......	11	30	31	4	......	6	......	39	9	26	165
Roscommon	......	......	1	6	......	......	10	......	......	......	......	73	19	......	109
Saginaw	14	11	191	426	285	264	197	212	411	849	1,069	637	474	175	5,215
St. Clair	......	21	88	276	225	49	82	86	115	122	98	199	68	15	1,444
St. Joseph	9	19	142	204	837	97	42	27	16	32	115	97	46	19	1,702
Sanilac	......	2	14	25	35	27	27	69	84	55	15	63	150	17	593
Schoolcraft	......	4	104	21	9	11	12	25	20	69	79	92	129	85	660
Shiawasee	3	104	80	357	181	41	28	28	48	86	252	199	119	43	1,569
Tuscola	1	23	116	42	10	17	17	38	512	15	300	211	60	105	1,467
Van Buren	......	3	45	7	28	83	2	4	8	47	37	19	32	......	315
Washtenaw	14	58	598	259	299	106	5	69	15	31	74	184	90	45	1,847
Wayne	3	56	326	5,466	3,868	1,419	438	588	317	495	1,083	1,501	1,367	372	17,299
Wexford	......	......	30	432	95	50	19	13	56	11	30	43	52	7	838

TABLE 23.—*Showing the number of deaths from influenza as reported to the Michigan State Board of Health, by weeks, for the months of October, November and December, 1918, for the State as a whole, and for each of the counties.*

	Total for week ending Oct. 5.	Total for week ending Oct. 12.	Total for week ending Oct. 19.	Total for week ending Oct. 26.	Total for week ending Nov. 2.	Total for week ending Nov. 9.	Total for week ending Nov. 16.	Total for week ending Nov. 23.	Total for week ending Nov. 30.	Total for week ending Dec. 7.	Total for week ending Dec. 14.	Total for week ending Dec. 21.	Total for week ending Dec. 28.	Total for two days Dec. 30-31.	Total deaths reported during Oct. Nov. and Dec. 1918.
STATE	30	240	654	936	949	575	469	328	359	459	548	592	454	152	6,745
Counties:															
Alcona	......	......	......	1	......	2	......	1	1	2	......	......	......	......	7
Alger	......	......	......	......	......	......	......	......	1	......	1	2	......	......	4
Allegan	1	......	6	3	9	3	5	......	3	6	2	2	2	4	46
Alpena	......	....	5	16	13	11	4	......	2	2	2	2	2	2	61
Antrim	......	......	7	10	7	8	5	......	3	1	......	1	......	......	42
Arenac	......	......	......	......	......	2	......	1	1	4	1	1	2	1	13
Baraga	......	......	1	1	......	......	1	......	2	......	1	1	1	2	10
Barry	......	2	2	......	7	2	2	3	2	2	1	3	2	1	29
Bay	......	......	1	7	13	26	33	9	11	16	10	17	13	5	161
Benzie	......	1	......	2	..	1	1	1	1	......	......	4	3	1	15
Berrien	......	2	14	24	19	12	9	8	5	10	20	9	11	1	144
Branch	......	4	7	22	7	4	2	5	1	3	1	3	......	1	60
Calhoun	....	11	31	26	18	15	8	3	7	11	9	23	7	5	174
Cass	......	......	3	14	5	1	4	2	1	2	1	4	2	1	40
Charlevoix	......	5	4	7	8	2	......	1	1	......	......	2	......	1	31
Cheboygan	......	......	1	6	4	3	2	......	2	1	1	......	......	......	20
Chippewa	......	2	21	12	10	15	13	4	......	2	1	......	1	1	82
Clare	......	......	......	......	......	......	......	2	4	......	......	......	......	......	6
Clinton	......	1	......	3	2	3	4	1	4	1	4	9	6	2	40
Crawford	......	......	......	1	......	3	......	1	......	......	......	1	......	......	6
Delta	......	2	4	3	4	7	3	......	7	10	14	10	4	3	71
Dickinson	......	......	......	......	......	......	......	......	2	7	3	4	......	......	16
Eaton	1	......	7	6	11	3	4	......	1	2	1	3	......	......	39
Emmet	......	15	7	12	3	3	2	1	1	2	5	9	5	3	68
Genesee	......	9	36	96	87	22	14	15	13	16	17	16	5	......	346
Gladwin	......	......	......	3	3	......	1	2	......	3	1	3	1	......	17
Gogebic	......	......	6	3	10	24	27	18	12	6	9	4	4	2	125
Grand Traverse	......	......	......	1	3	......	2	1	......	2	6	10	14	1	40
Gratiot	......	......	3	3	6	......	3	3	2	2	5	6	5	1	39
Hillsdale	......	......	2	2	......	3	1	2	......	2	5	6	3	2	28
Houghton	......	6	5	4	8	8	4	3	2	7	8	4	11	9	79
Huron	......	......	2	1	7	8	4	8	9	5	11	5	1	2	63
Ingham	1	6	14	23	27	12	8	7	2	7	7	13	14	3	144
Ionia	......	......	6	6	8	5	4	......	3	6	6	6	6	2	58

Iosco	......	......	4	2	1	......	1	1	......	......	......	......	......	......	9
Iron	......	......	......	......	......	......	......	1	......	6	4	4	3	2	20
Isabella	......	......	1	1	3	5	3	4	3	2	4	15	16	5	62
Jackson	2	21	46	43	19	7	3	3	3	3	7	8	11	1	177
Kalamazoo	1	58	110	49	25	6	13	7	7	17	13	12	15	3	344
Kalkaska	......	......	1	6	5	3	......	2	......	1	1	......	1	......	20
Kent	2	3	8	17	11	17	25	15	18	26	35	65	19	6	266
Keweenaw	......	......	......	......	......	......	......	......	......	......	......	2	1	1	4
Lake	......	......	......	......	......	1	1	......	......	......	1	1	......	......	4
Lapeer	......	1	3	5	6	8	5	1	3	2	2	3	2	2	43
Leelanau	......	......	......	......	......	......	3	3	2	4	2	9	2	1	26
Lenawee	......	......	6	10	15	13	14	9	7	8	7	14	8	4	115
Livingston	......	1	1	3	4	1	3	......	1	3	....	6	1	1	25
Luce	2	......	15	24	24	7	5	1	......	......	......	......	2	1	81
Mackinac	......	......	......	4	2	......	2	......	......	......	......	......	2	......	10
Macomb	1	1	2	9	4	9	2	3	6	4	6	5	......	3	55
Manistee	......	......	3	8	6	2	......	......	......	1	1	2	7	2	32
Marquette	......	1	4	4	2	4	5	4	11	15	22	9	5	3	89
Mason	......	2	4	......	1	1	......	2	......	......	7	4	6	......	27
Mecosta	......	......	......	......	1	1	......	2	2	4	5	5	8	6	34
Menominee	1	3	......	5	2	......	5	5	4	16	12	6	7	1	67
Midland	......	......	......	3	5	1	2	4	8	6	3	1	2	......	35
Missaukee	......	......	1	......	4	2	1	......	......	1	3	1	3	2	18
Monroe	1	......	4	9	6	2	4	1	7	6	1	3	3	......	47
Montcalm	......	......	7	8	4	4	3	1	3	13	11	7	3	......	64
Montmorency	......	......	......	......	1	......	......	1	1	......	1	......	1	......	5
Muskegon	......	3	5	15	11	13	10	6	6	10	9	14	10	1	113
Newaygo	......	......	1	......	1	2	1	1	3	1	3	2	......	......	15
Oakland	......	1	12	15	14	9	7	14	21	19	19	10	4	3	148
Oceana	......	......	3	4	4	3	1	......	1	1	1	2	2	......	22
Ogemaw	......	......	......	......	......	1	1	......	......	......	......	......	......	1	3
Ontonagon	......	......	......	......	......	3	1	5	3	......	......	2	4	......	18
Osceola	......	......	......	1	5	1	1	1	5	5	3	2	1	1	26
Oscoda	......	......	......	......	......	......	......	......	......	......	......	......	......	......	....
Otsego	......	......	3	2	2	2	3	1	2	......	1	1	......	2	19
Ottawa	......	......	1	5	2	5	5	11	10	8	11	5	11	3	77
Presque Isle	......	......	......	......	3	1	......	......	......	1	......	1	5	......	11
Roscommon	......	......	......	......	......	......	1	......	......	......	......	......	......	......	1
Saginaw	......	......	1	8	11	7	12	7	13	14	37	34	23	2	169
St. Clair	1	1	......	3	12	14	9	11	5	14	5	5	6	3	89
St. Joseph	......	1	3	9	16	5	5	1	......	3	3	3	2	1	52
Sanilac	......	......	......	1	3	3	1	1	4	3	6	2	4	......	28
Schoolcraft	......	1	......	2	......	1	......	2	......	4	6	8	3	......	27
Shiawasee	......	2	4	11	17	10	5	2	5	9	9	9	6	2	91
Tuscola	1	......	......	2	15	6	3	6	10	3	11	7	5	1	70
Van Buren	......	3	4	1	2	2	2	4	9	11	7	7	7	......	59
Washtenaw	......	8	38	37	32	13	4	3	1	4	5	8	6	5	164
Wayne	15	62	160	283	341	170	122	74	67	66	110	105	97	28	1,700
Wexford	......	1	4	9	8	1	7	6	2	5	2	1	5	......	51

INFLUENZA IN MICHIGAN

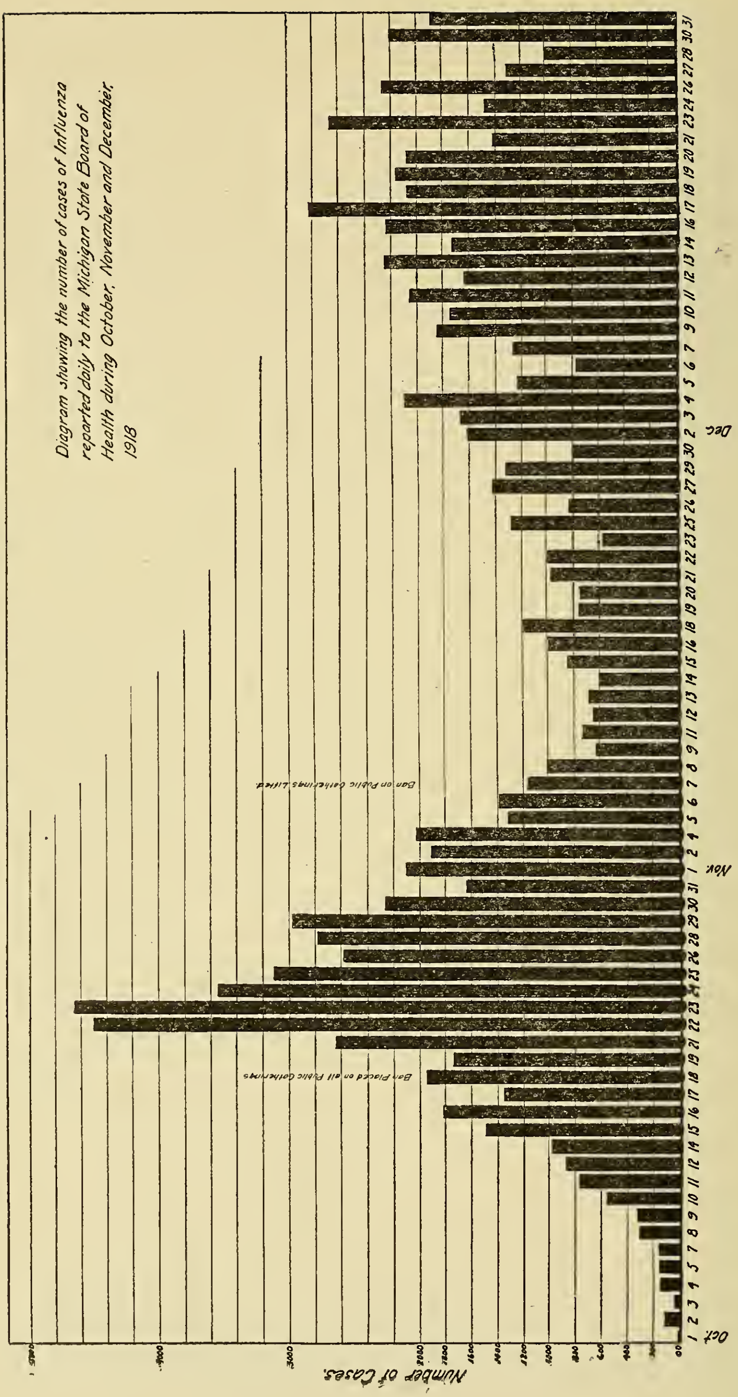


Diagram showing the number of cases of Influenza reported daily to the Michigan State Board of Health during October, November and December, 1918

PREVALENCE OF INFLUENZA IN MICHIGAN DURING THE FALL OF 1918, BY AGE GROUPS AND SEX.

As before stated there were 116,302 cases of influenza reported to this department during the months of October, November and December, 1918. Of the above number of reported cases there were 56,794 reports in which were given the age and sex. However, there is no reason to believe that the failure to state the age or sex would effect any one age group or sex more than the other; so basing our data on the 56,794 cases in which the information sought for was given, we do not believe that the per cents shown in Table 22 would be changed to any great extent if the age and sex had been available on the 116,302 cases.

As the failure of the health authorities throughout the State to state the age and sex of recognized cases of influenza did not affect any one geographical section, county, city or village more than another, there is no reason to believe but that the data shown in the following table would be fairly accurate in comparing the prevalence of this disease of one age group with another, or for comparing the prevalence as to sex for the State as a whole, or for each of the age groups given.

According to the data shown in the following table, the males were no more susceptible to this disease than were the females, and contrary to the belief of a great many persons, that school children were not so liable to contract this disease as were persons of the older age groups, the reverse conditions seem to be true. It will be seen in the column captioned "per cent of total cases at each age group to the total number," that 9.2 per cent of the total number of cases were among children under 5 years of age, or those under the school age. For the next group age from 5 to 9 years we find claimed 14.5 per cent of the cases, while the group of 10 to 14 years 12.9 per cent and the last group constituting the school age, 15 to 19 years, 11.4 per cent. Taking the persons constituting the school age or those whose ages range from 5 to 19 years inclusive, we find that 38.8 per cent of the total number of cases were among those of the school age, and combining the above per cent (38.8) with that for the children under the school age (9.2 per cent) we have 48.0 per cent of all the cases were among children and persons under 20 years of age.

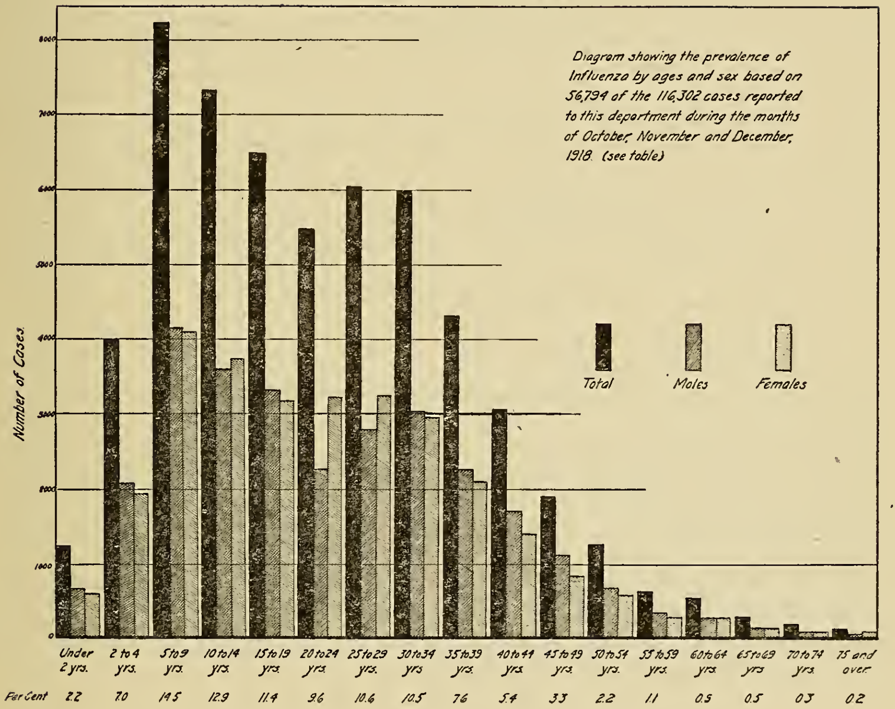
As before stated, 14.5 per cent of all the cases were among children whose ages ranged from 5 to 9 years. We find that with each older age group the per cent decreases until the age group of 75 years and over is reached, where only two-tenths per cent of the total cases were among this age group, or in other words the older the person the less liable they were to contract this disease.

It would be well to study Table 25, in which is shown the number and per cent of deaths at each age group, with Table 24, which treats with the cases only. The two following diagrams relative to the two above mentioned tables bring out more clearly the facts mentioned above.

TABLE 24.—*Showing the number of cases of influenza reported to the Michigan State Board of Health, for the months of October, November and December, 1918, in which were given the age and sex, by age groups and sex. The per cent of total cases at each age group to the total number (55,794) is also given. During the above three months the total number of cases reported to this department was 116,302, but only 56,794 instances gave the age and sex.*

	October.			November.			December.			Total.			Per cent of total cases at each age group to total number
	Total.	Males.	Females	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	
ALL AGES............	**16,232**	**8,253**	**7,979**	**12,994**	**6,394**	**6,600**	**27,568**	**13,669**	**13,899**	**56,794**	**28,316**	**28,478**	**100.0**
Under 2 years..........	295	148	147	287	153	134	641	346	295	1.223	647	576	2.2
2 –4 years............	1,068	580	488	871	431	440	2,038	1,047	991	3,977	2,058	1,919	7.0
5 –9 years............	2,146	1,107	1,039	1,955	974	981	4,117	2,051	2,066	8,218	4,132	4,086	14.5
10–14 years............	1,938	961	977	1,587	766	821	3,778	1,854	1,924	7,303	3,581	3,722	12.9
15–19 years............	1,981	1,017	964	1,498	768	730	2,983	1,524	1,459	6,462	3,309	3,153	11.4
20–24 years............	1,809	759	1,050	1,266	514	752	2,373	963	1,410	5,448	2,236	3,212	9.6
25–29 years............	1,802	871	931	1,443	661	782	2,773	1,252	1,521	6,018	2,784	3,234	10.6
30–34 years............	1,730	921	809	1,404	698	706	2,824	1,398	1,426	5,958	3,017	2,941	10.5
35–39 years............	1,240	664	576	975	494	481	2,075	1,075	1,000	4,290	2,233	2,057	7.6
40–44 years............	830	451	379	686	378	308	1,523	849	674	3,039	1,678	1,361	5.4
45–49 years............	553	334	219	383	233	150	954	521	433	1,890	1,088	802	3.3
50–54 years............	335	179	156	269	139	130	623	341	282	1,227	659	568	2.2
55–59 years............	177	96	81	129	69	60	315	172	143	621	337	284	1.1
60–64 years............	159	81	78	116	57	59	261	129	132	536	267	269	.9
65–69 years............	79	46	33	54	24	30	142	73	69	275	143	132	.5
70–74 years............	60	24	36	45	25	20	90	49	41	195	98	97	.3
75 years and over.......	30	14	16	26	10	16	58	25	33	114	49	65	.2

INFLUENZA IN MICHIGAN



AGE DISTRIBUTION OF THE FATAL CASES OF INFLUENZA DURING THE MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1918.

In the following table is shown the total number of deaths from influenza reported to this department during the months of October, November and December, 1918. The total number of deaths by sex for each of the various age groups is also shown for the three months stated above. The per cent of deaths occurring in each of the age groups to the total number reported will be found in the column captioned "per cent of deaths at each age group to the total number."

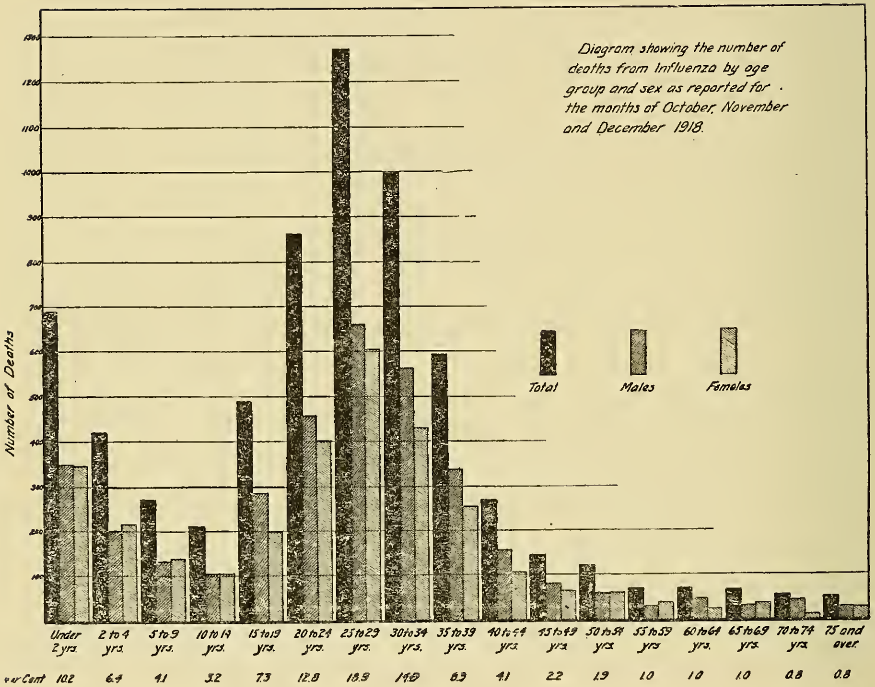
In comparing the total number of deaths by sex for the months given and for the total of the three months, it will be noticed that the total number of deaths among the males was 16.2 per cent greater than those among the females. In considering the number of deaths by sex up to the 20th year of age we find that the males exceed those of the females by 69, which is equivalent to only 6.8 per cent, while among those whose ages range from 20 to 29 years of age the males again predominate; during this age the number of deaths among the males is 10.6 per cent greater than those among the females, and for the ages of from 30 to 39 years the male deaths exceed those of the females by 31.2 per cent. For those whose ages are in the forties the male deaths are 40 per cent greater than those among the females. For the older age groups it will be found that the deaths among the males exceed those of the females in nearly all of the instances.

In the column captioned "per cent of deaths at each age group to the total number" it will be noticed that the greater number of deaths from this disease occurred among those whose ages ranged "under 2 years of age," and those of from 20 to 35 years of age. According to the data shown in this column 10.2 per cent of the deaths were among children under two years of age and 46.6 per cent were among those whose ages ranged from 20 to 35 years. The number of deaths among those of the school ages or from 5 to 19 years was only 14.6 per cent of the total number of deaths. The per cent of deaths occurring in each of the age groups to the total number of deaths, beginning with the 40th year, gradually decreases until for the age group of 75 years and over we find only eight-tenths per cent of the total number of deaths occurred during this age group.

TABLE 25.—*Showing the number of deaths from influenza, reported to the Michigan State Board of Health, for the months of October, November and December, 1918, by age and sex. There is also shown the number of deaths occurring in each age group by sex. The per cent of deaths occurring in each age group to the total number of deaths at all ages will be found in the last column of this table.*

	October.			November.			December.			Total.			Per cent of deaths at each age group to total number
	Total.	Males.	Females	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	
ALL AGES	2,481	1,408	1,073	2,059	1,099	960	2,205	1,119	1,086	6,745	3,626	3,119	100.0
Under 2 years	213	102	111	254	127	127	224	118	106	691	347	344	10.2
2 –4 years	156	76	80	154	81	73	111	45	66	421	202	219	6.4
5 –9 years	101	47	54	98	53	45	75	34	41	274	134	140	4.1
10–14 years	74	38	36	66	36	30	75	34	41	215	108	107	3.2
15–19 years	184	108	76	146	82	64	162	100	62	492	290	202	7.3
20–24 years	399	250	149	232	102	130	234	108	126	865	460	405	12.8
25–29 years	516	301	215	353	165	188	404	197	207	1,273	663	610	18.9
30–34 years	362	217	145	266	151	115	374	199	175	1,002	567	435	14.9
35–39 years	184	99	85	194	120	74	220	122	98	598	341	257	8.9
40–44 years	92	56	36	77	45	32	104	60	44	273	161	112	4.1
45–49 years	44	18	26	52	36	16	53	27	26	149	81	68	2.2
50–54 years	37	24	13	49	24	25	39	14	25	125	62	63	1.9
55–59 years	27	16	11	15	6	9	28	9	19	70	31	39	1.0
60–64 years	24	16	8	25	19	6	24	13	11	73	48	25	1.0
65–69 years	22	11	11	23	11	12	25	11	14	70	33	37	1.0
70–74 years	14	11	3	23	18	5	20	15	5	57	44	13	.8
75 years and over	16	8	8	14	11	3	24	9	15	54	28	26	.8
Years not stated	16	10	6	18	12	6	9	4	5	43	26	17	.6

INFLUENZA IN MICHIGAN



DIPHTHERIA IN MICHIGAN IN 1918 AND PRECEDING YEARS.

GENERAL PREVALENCE.

In Table 26 are shown the reported cases, the deaths, and the death rates per 100,000 population, together with the case fatality rates, from diphtheria and croup, in Michigan, during each of the years 1900-1918 inclusive.

For the years 1900 to 1904 we have an annual average of 3,077 cases and 543 deaths reported to this department; these 543 deaths correspond to a death rate of 21.9 per 100,000 population. For the second period of years we find that our annual averages are 3,101 cases and 439 deaths. This average number (439) deaths for this group of years corresponds to a death rate of 16.1 per 100,000 population, which is a decrease of 26.5 per cent over the rate for the first period of years. In considering the third group of years, or the years from 1912 to 1918 inclusive, we find that the annual average shows an increase in both the number of cases and deaths reported to this department; the average number of cases reported annually during this period were 5,514 and the deaths 577. The annual average number of cases reported during this latter group of years increased 77.8 per cent, while the number of deaths increased 31.4 per cent over the average number reported during the preceding seven years, or the years 1905-1911 inclusive. In comparing the annual average death rates for the two later periods, or 1905-1911 and 1912-1918 it will be noticed that the rate for the latter period shows an increase of 18.6 per cent over that for the years 1905-1911.

As for the years 1917 and 1918 they show a decided increase in the number of cases and deaths from this disease reported to this department; the death rates for these two years also show an increase over the average rates for the preceding seven years. In comparing the death rates for the years 1917 and 1918 with the annual average rate for the years 1912-1918, inclusive, the rate for 1917 is 42.4 per cent and the rate for 1918 is 14.1 per cent greater than the annual average rate for the years included in the latter group.

During the year 1917 this State experienced an epidemic from diphtheria and croup. The number of deaths reported to the Michigan State Board of Health during this year was 265 more than the average for the years 1912-1918, and by reference to Table 27, which shows the number of cases, deaths and the death rate by years in the principal cities of the State, it will be noted that practically half of the cities shown in this table have an extremely high death rate for the year 1917, as compared with that for the State as a whole. It will also be noted that the average rate for all of the cities shown in this table for the year 1917 was very much higher than the rate for the State. As for the year 1918, while the number of reported cases, deaths and death rate, shows a decided decrease over the year 1917, it is still considerably higher than the rate for the years 1912-1918.

TABLE 26.—*The prevalence of diphtheria and croup in Michigan during each of the years 1900-1918, inclusive.*

Years.	Reported Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1900	2,706	535	19.8	22.1
1901	2,498	509	20.4	20.7
1902	2,993	489	16.3	19.5
1903	3,670	684	18.6	26.9
1904	3,510	500	14.2	19.3
Annual average, 1900-1904	**3,077**	**543**	**17.6**	**21.9**
1905	2,159	467	21.6	17.8
1906	3,648	469	12.9	17.6
1907	2,935	414	14.1	15.3
1908	2,658	346	13.0	12.6
1909	3,109	402	12.9	14.4
1910	3,433	495	14.4	17.6
1911	3,762	472	17.1	16.5
Annual average, 1905-1911	**3,101**	**439**	**14.2**	**16.1**
1912	3,294	467	14.2	16.1
1913	5,505	676	12.3	23.0
1914	5,149	512	9.9	17.2
1915	4,386	361	8.2	12.0
1916	5,625	499	8.9	16.3
1917	8,499	842	9.8	27.2
1918	6,128	683	11.1	21.8
Annual average, 1912-1918	**5,514**	**577**	**10.5**	**19.1**

THE PREVALENCE OF DIPHTHERIA AND CROUP IN THE URBAN DISTRICTS OF MICHIGAN.

In Table 27 is shown the reported number of cases, deaths and the death rates per 100,000 population in each of the cities of Michigan having an estimated population of 10,000 inhabitants or over for each of the years 1905 to 1918, inclusive. The cities shown in this table constitute what is termed throughout this report as the Urban District of Michigan, while all cities having less than 10,000 population, with all villages and townships, are included in what is termed the Rural District.

The years shown in the above mentioned table, namely, 1905-1918, have been divided into two seven-year periods, and the total number of cases, deaths and the annual average death rate, per 100,000 population, are shown for each period for each of the cities, and also for the cities as a whole. The per cent of increase or decrease for each of the cities and for the cities as a whole, in their death rates for the latter periods, as compared with those of first groups of years, is also shown in this table.

It will be noted that the annual average death rate, per 100,000 population, for all cities combined for the years 1905-1911 was 19.0 per cent, while the rate for the latter period, or the years 1912-1918, was 29.9 per cent per 100,000 population. The rate for all cities combined increased 57.4 per cent during the latter over that of the first.

The cities whose annual average death rate shows the greatest increase for the latter period over that of the first, together with the per cent of increase, were: Ann Arbor, 375.8 per cent; Lansing, 107.7; Battle Creek, 104.2; Detroit, 65.2; Traverse City, 64.7; Flint, 97.4; Kalamazoo; 39.4; Pontiac, 37.3; Bay City, 47.4; Manistee, 25.1; Sault Ste. Marie, 22.7, and Jackson, 15.0. The cities whose annual average rate for the years 1912-1918 show a decrease over those for the years 1905-1911 were Escanaba, 79.3 per cent; Ironwood, 87.7; Marquette, 72.2; Ishpeming, 69.3; Alpena, 67.0; Menominee, 38.5; Saginaw, 36.4; Adrian, 39.7; Muskegon, 31.0; Port Huron, 18.1, and Grand Rapids, 1.0.

It might be well to study this table in conjunction with the following one, in which the number of reported cases, deaths, death rates, etc., are shown for the urban as well as for the rural districts of the State.

TABLE 27.—*Showing the reported cases, deaths and death rates per 100,000 popu*
estimated population of 10,000 or over in

		1905	1906	1907	1908	1909	1910	1911
CITIES (total)	**Cases....**	**934**	**2,065**	**1,456**	**1,440**	**1,770**	**2 ,175**	**2,370**
	Deaths..	**238**	**223**	**182**	**156**	**188**	**238**	**257**
	Rates....	**26.9**	**24.3**	**19.2**	**16.0**	**18.6**	**22.9**	**24.0**
Adrian........	Cases....	2	....	2	15	....	3	28
	Deaths...	1	....	2	1	....	....	5
	Rates....	9.4	....	18.7	9.3	....	....	45.9
Alpena........	Cases....	....	8	2	12	15	2	1
	Deaths...	....	....	1	11	7	....	1
	Rates....	....	....	8.0	8.7	48.9	....	7.8
Ann Arbor.....	Cases....	2	12	7	9	4	27	19
	Deaths...	....	3	....	....	2	....	1
	Rates....	....	20.4	....	....	13.5	....	6.7
Battle Creek...	Cases....	47	68	95	36	38	44	102
	Deaths...	3	1	7	....	2	3	4
	Rates....	13.6	4.4	30.0	....	8.1	11.8	15.3
Bay City......	Cases....	15	17	22	47	82	92	81
	Deaths...	7	4	10	5	5	4	7
	Rates....	16.3	9.2	2.8	11.3	11.2	8.8	15.3
Detroit........	Cases....	118	691	631	733	1,018	1,296	1,348
	Deaths...	118	86	80	69	109	159	167
	Rates....	31.2	21.7	19.3	15.9	24.2	33.9	34.3
Escanaba......	Cases....	....	5	27	41	29	109	40
	Deaths...	....	1	3	7	2	10	5
	Rates....	....	8.5	24.7	55.9	15.5	75.4	36.7
Flint..........	Cases....	11	48	....	2	8	48	35
	Deaths...	....	12	....	1	1	6	5
	Rates....	....	41.7	....	2.9	2.7	15.3	12.0
Grand Rapids..	Cases....	330	587	303	101	116	87	74
	Deaths...	34	55	29	12	9	12	12
	Rates....	23.9	53.4	27.5	11.1	8.1	10.6	10.4
Ironwood......	Cases....	4	1	8	8	18	23	5
	Deaths...	4	1	8	8	18	7	1
	Rates....	35.4	8.6	67.0	65.3	143.2	54.3	7.6
Ispheming.....	Cases....	8	6	40	183	144	52	70
	Deaths...	3	....	5	16	10	6	6
	Rates....	23.3	....	39.4	126.9	79.8	48.2	47.5
Jackson........	Cases....	35	71	29	34	34	24	69
	Deaths...	12	11	5	2	3	2	5
	Rates....	42.3	37.9	16.9	6.6	9.7	6.3	15.5
Kalamazoo.....	Cases....	82	91	39	31	23	29	30
	Deaths...	4	7	1	1	2	1	2
	Rates....	12.4	20.8	2.8	2.7	5.3	2.5	4.8
Lansing........	Cases....	9	8	11	56	43	32	19
	Deaths...	5	....	1	6	5	2	1
	Rates....	20.8	....	3.7	21.0	16.6	6.3	3.0
Manistee......	Cases....	19	42	9	4	10	18	24
	Deaths...	7	1	1	....	....	3	2
	Rates....	52.6	7.6	7.7	....	....	24.2	16.4

lation, from diphtheria and croup, in each of the cities in Michigan, having an 1910, during the years 1905-1918, inclusive.

Total cases and deaths and annual average death rate 1905-1911	1912	1913	1914	1915	1916	1917	1918	Total cases and deaths and annual average death rate 1912-1918	Per cent increase + or decrease − between the two periods, 1905-1911—1912-191
12,210 1,482 19.0	2,182 274 24.9	3,849 410 36.2	3,295 271 23.2	2,943 135 15.6	4,411 345 28.3	6,518 577 46.5	4,453 432 33.2	27,651 2,486 29.9	+57.4
50 9 12.1	1 1 9.1	4 2 18.0	....	....	....	3 3 23.9	....	8 6 7.3	−39.7
40 20 23.0	3 3 23.2	59 1 7.7	22	5	6 2 15.1	2	2 1 7.4	99 7 7.6	−670
81 6 5.8	10 2 13.4	31 1 6.7	57 4 26.8	56	37 5 33.3	92 13 86.4	58 4 26.5	341 29 27.6	+375.8
430 20 11.9	97 8 29.9	80 7 25.5	53 3 10.7	20 2 6.9	25	189 12 39.7	236 17 55.0	700 49 24.3	+104.2
356 42 13.7	8 4 8.7	13 2 4.3	42 6 12.8	68 9 18.9	56 8 16.7	59 29 60.0	126 9 18.4	372 67 20.2	+47.4
5,835 788 26.4	1,438 187 37.0	2,720 300 57.3	1,964 157 29.0	1,984 114 20.3	3,604 260 45.5	5,130 409 69.4	2,882 268 44.3	19,722 1.695 43.6	+65.2
251 28 31.9	9 2 14.3	3 3 20.9	2 1 6.8	2	2	2	5 1 6.1	25 7 6.6	−79.3
152 25 11.5	38 1 2.3	67 8 17.1	166 12 24.3	161 10 19.2	146 13 23.7	249 20 34.9	304 19 31.7	1,131 83 22.7	+97.4
1,598 163 21.7	117 15 12.7	414 53 43.9	282 33 26.8	158 15 11.9	84 8 6.2	195 34 26.0	202 31 24.0	1,452 189 21.5	−1.0
67 47 56.0	3	13	32 2 14.1	5	18 1 6.9	18 2 13.6	28 2 13.5	117 7 6.9	−87.7
503 46 54.1	9 1 8.1	7 2 16.4	56 1 8.2	18 3 24.9	4 4 33.5	5	8 3 27.8	107 14 16.6	−69.3
296 40 19.3	45 17 51.8	3 3 9.0	8 3 8.8	108 6 17.3	52 8 22.6	90 8 22.2	69 9 24.6	375 54 22.2	+15.0
325 18 7.1	36 7 16.4	44 3 6.8	26 4 8.7	32 2 4.2	29	144 10 19.8	67 7 13.5	378 33 9.9	+39.4
178 20 10.4	38 3 8.7	41 5 13.9	42 3 8.0	82 7 17.7	162 13 32.1	85 7 16.7	200 21 48.4	650 59 21.6	+107.7
126 14 16.0	9	20 1 8.5	19 8 68.8	8 1 8.6	4	12 6 50.8	1	73 16 20.1	+25.1

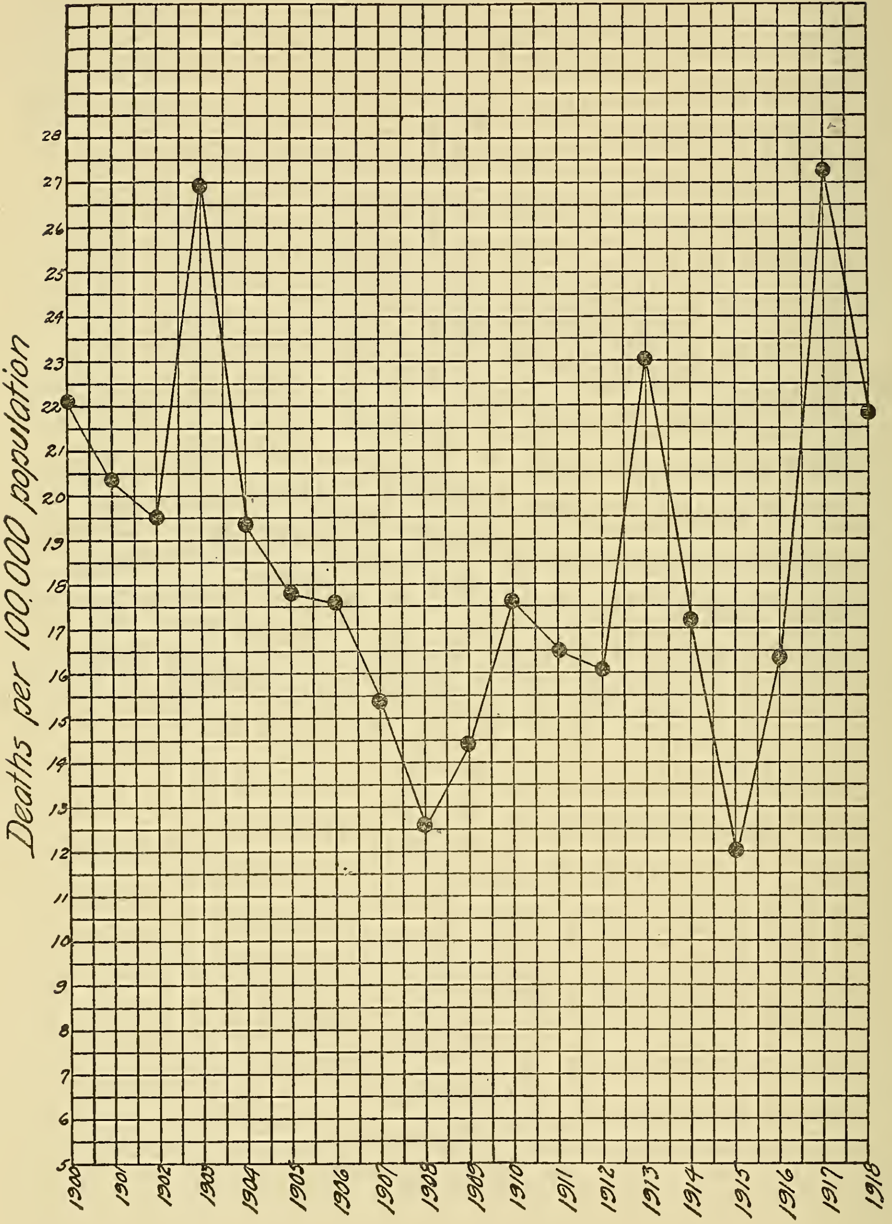
TABLE 27

		1905	1906	1907	1908	1909	1910	1911
Marquette	Cases	5	28	27	8	9	15	7
	Deaths	....	3	4	1	2	....	3
	Rates	....	27.4	36.1	8.9	17.6	....	25.7
Menominee	Cases	12	....	2	4	1	10	8
	Deaths	3	....	1	2	....	1	2
	Rates	25.7	....	8.9	18.2	....	9.5	19.5
Muskegon	Cases	14	68	57	13	2	14	5
	Deaths	4	5	4	3	....	1	1
	Rates	17.8	21.9	17.3	12.8	....	4.1	4.1
Pontiac	Cases	1	1	3	15	86	108	57
	Deaths	1	1	3	1	4	4	3
	Rates	8.2	7.9	22.8	7.3	28.3	27.3	19.8
Port Huron	Cases	60	140	5	6	7	82	26
	Deaths	12	12	1	....	....	11	2
	Rates	63.1	63.2	5.3	....	....	58.3	10.6
Saginaw	Cases	148	148	100	65	56	53	300
	Deaths	17	20	9	6	4	4	18
	Rates	36.5	42.2	18.7	12.2	8.0	7.9	36.1
Sault Ste. Marie	Cases	4	5	11	9	13	5	20
	Deaths	2	....	5	4	3	1	4
	Rates	17.2	....	41.6	32.7	24.1	7.7	30.1
Traverse City	Cases	8	20	26	8	13	2	2
	Deaths	1	....	2	....	....	1	....
	Rates	9.3	....	17.6	....	....	8.2	....

—*Continued.*

Total cases and deaths and annual average death rate 1905-1911	1912	1913	1914	1915	1916	1917	1918	Total cases and deaths and annual average death rate 1912-1918	Per cent increase+or decrease−between the two periods, 1912-1818.
99	26	4	3	1	4	5	6	49	
13	1	1	1	....	1	....	....	4	
16.9	8.5	8.4	8.3	....	8.1	....	....	4.6	−72.2
37	....	1	4	3	4	....	3	15	
9	....	....	1	....	2	....	2	5	
12.2	....	....	10.4	....	22.1	....	23.3	7.5	−38.5
173	3	21	30	33	6	6	16	115	
18	....	2	4	2	1	2	3	14	
11.3	....	8.0	15.7	7.8	3.8	7.6	11.2	7.8	−31.0
271	41	41	163	90	24	93	77	529	
17	2	2	5	11	3	6	....	29	
17.7	12.8	12.4	30.2	64.5	17.1	33.3	....	24.3	+37.3
326	9	29	74	5	18	14	10	159	
38	2	5	7	....	2	6	8	30	
28.1	10.6	26.6	37.3	....	10.7	32.2	43.0	23.0	−18.1
870	206	146	170	72	91	83	122	890	
78	12	6	5	3	9	6	14	55	
22.5	22.9	11.3	9.3	5.5	16.2	10.5	24.4	14.3	.... −36.4
67	28	85	76	29	28	40	29	315	
19	4	3	7	1	4	3	4	26	
22.0	30.5	22.6	51.9	7.3	28.7	21.2	27.2	27.0	+22.7
79	8	3	4	3	7	2	2	29	
4	2	....	4	....	1	1	....	8	
5.1	15.7	....	30.1	....	7.2	7.1	....	8.4	+64.7

Diagram showing the prevalence of Diphtheria and Croup in Michigan during the years 1900-1918.



The years shown in the following table, namely, 1904 to 1918, are divided into three five-year periods. In each of these groups are shown the total number of cases and deaths occurring in the urban and rural districts of the State during these years, the deaths per 100 reported cases and the annual average number of cases and deaths per 100,000 estimated population of corresponding district.

During the years of the first period, 1904-1908, there were 147.5 persons out of each 100,000 inhabitants taken sick annually in the urban districts, while in the rural districts for the same period the attack rate was 90.9 per cent per 100,000 population. The death rate, per 100,000 population, for the urban and rural districts for the above mentioned years was 20.0 and 14.6 per cent, respectively.

In comparing the data shown in the following table for these two districts during the following five years it will be noticed that the "deaths per 100 cases" remain practically the same as for the first group of years, while the annual average number of cases per 100,000 population shows an increase in the urban districts and a decrease is noted in the rural districts. The death rates, per 100,000 population, for the urban and rural districts for the years 1909-1913 show a slightly higher rate in the urban localities, while a decrease is noted in the rural districts, than for the previous five years.

For the years 1914 to 1918, inclusive, a considerable increase of reported cases and deaths is noted in each of the districts as compared with the preceding five years, while the number of deaths, per 100 cases, is less, which would indicate that this department is receiving more accurate information as to the real number existing cases, or that the physicians of the State are meeting with more success in treating this disease. No doubt this decrease can be given to both of the above reasons. The great increase in the annual average number of cases per 100,000 population in the urban districts during the years 1914-1918 is very noticeable. The case rate for this period is nearly twice that of the former five years, while in the rural districts the case rate for these two periods remains practically the same. This proves beyond question that a person is more liable to contract this disease in the urban districts than in the rural districts, while the data shown in the column captioned. "Deaths per 100 cases," indicate that a person living in the urban districts has a better chance to recover from this disease after being attacked with same than a person living in the rural districts.

TABLE 28.—*Showing the prevalence of diphtheria and croup in the urban and rural localities of Michigan for the years 1904-1908, 1909-1913 and 1914-1918.*

Years.		Total cases reported.	Total deaths reported.	Deaths per 100 cases.	Annual average number of cases per 100,000 population	Annual average number of deaths per 100,000 population
1904–1908	Urban	7,617	1,024	13.4	147.5	20.0
	Rural	7,293	1,172	16.1	90.9	14.6
1909–1913	Urban	12,346	1,367	11.1	197.5	21.8
	Rural	6,757	1,145	16.9	84.0	14.2
1914–1918	Urban	21,620	1,805	8.3	357.9	29.9
	Rural	8,167	1,082	13.2	88.5	11.8

AGE DISTRIBUTION OF FATAL CASES OF DIPHTHERIA AND CROUP IN MICHIGAN, AND THE COMPARATIVE PROBABILITY OF DYING FROM THIS DISEASE WITHOUT REGARD TO ATTACK, AS BETWEEN THE VARIOUS AGE GROUPS.

In Table 29 is shown the age distribution of the fatal cases of diphtheria and croup that occurred in Michigan during the years 1900-1918, inclusive. The data shown in this table compares the years 1917 and 1918 with the annual average of the years 1900 to 1916, inclusive. The number of deaths, the per cent and the death rate, per 100,000 population, of corresponding age are given for each age group. In this table is shown the comparative probability of dying from this disease, without regard to attack, as between the age groups during each of the three periods of years, and as between the three periods of years for those of the same ages, as indicated by the relation of the death rates, per 100,000 population, of corresponding ages for each age group for the three periods of years, and by the relation of the death rates as between the three periods.

It will be seen by the following table that of all the deaths from diphtheria and croup that occurred in Michigan during the years 1900 to 1918, inclusive, nearly one-half of these deaths were among children under 5 years of age, and 30 per cent were among children whose ages were from 5 to 9 years; 14 per cent among persons whose ages ranged from 10 to 19 years, leaving only 6 per cent of the total number of deaths to be distributed throughout the older age groups.

In comparing the death rate, per 100,000 population, for the years 1917 and 1918 with the annual average rate for the years 1900 to 1916, the increase is very noticeable, especially for the year 1917, while the general death rate for this year increased 52.8 per cent over that for the years 1900-1916. This great increase was due entirely to the increase of deaths among children under five years of age. The death rate among children of from 5 to 9 years during 1917 increased 72.3 per cent over that of the average rate for the years 1900-1916. In comparing the rates of the older age groups during these two periods, while we find the rate for 1917 greater, the difference is not so noticeable. As for the year 1918, while it shows a decrease in the general rate of 20 per cent over that for the previous year, it still has a rate that is 22.5 per cent larger than the average for the years 1900-1916. This increase also occurred among the children under 5 years of age.

Considered by age groups, it will be noted that children under 5 years of age are more liable to die from this disease, without regard to attack of same, than are those of any of the other age groups. The liability of dying from this disease at this age group is practically five times greater than on the average for all ages, and three times greater than for the children aged 5 to 9 years. For those whose ages range from 10 to 19 years their liability of dying from diphtheria and croup is slightly less than for those of all ages. Beginning with the age group of from 20-29 years, the chances of dying from this disease is very slight, the death rate declining with each older age group.

TABLE 29.—*Showing the age distribution of decedents from diphtheria in Michigan, for the years 1918-1917, also the annual average for the years 1900-1916. Also showing the per cent of deaths at each age group to the total number, and the death rates per 100,000 population of the same age.*

Age groups.	1918.			1917.			Average 1900-1916.		
	Deaths.	Per cent.	Deaths per 100,000 popula-tion. of same age.	Deaths.	Per cent.	Deaths per 100,000 popula-tion of same age.	Deaths	Per cent.	Deaths per 100,000 popula-tion of same age.
ALL AGES. . . ,.	**683**	**100,0**	**21,8**	**842**	**100,0**	**27.2**	**488**	**100,0**	**17,8**
Under 5 years. .	339	49.6	102.7	411	48.8	126.0	241	49.4	82.6
5 –9 years. . . .	192	28.0	67.4	266	31.6	94.1	149	30.5	54.6
10–19 years. . . .	93	13.6	16.5	98	11.6	17.4	69	14.1	13.3
20–29 years. . . .	23	3.4	4.0	30	3.6	5.3	14	2.9	2.9
30–39 years. . . .	16	2.3	3.5	22	2.6	4.9	6	1.2	1.5
40–49 years. . . .	12	1.8	3.3	11	1.3	4.3	5	1.0	1.7
50–59 years. . . .	3	.4	1.7	1	.1	.4	2	.4	.9
60–69 years. . . .	1	.1	.6	1	.1	.6	1	.2	.7
70–79 years. . . .	....	......	....	1	.1	1.2	. . ,*. . . .	.1	.7
80 yrs. and over	....	......	....	....	......	....	. . .*. . . .		.67
Not stated ages	4	.6	....	1	.1	....	1	.2	....

NOte * is less than one.

THE SEASONAL PREVALENCE OF DIPHTHERIA.

As may be seen by the data shown in the following table, diphtheria is a cold weather disease and is most prevalent during the winter months, or from October to February, inclusive, than it is during any of the other months, and is less prevalent during the months of from April to September. Practically two-thirds of all the deaths from this disease occurs during the winter months.

In comparing the data shown in the following table for the three given periods, namely, 1918, 1917, and the annual average for the years 1910-1916, it will be seen that the months in which the greatest and least prevalency of this disease occurs remain practically the same.

TABLE 30.—*Showing the seasonal prevalence of diphtheria in Michigan, as indicated by the number of deaths from this disease in each month, during the years 1918 and 1917, and for the average for the years 1910-1916.*

	Number of deaths occurring in each month during 1918.	Deaths reduced to a standard of 100	Number of deaths occurring in each month during 1917.	Deaths reduced to a standard of 100	Average annual number of deaths occurring in each month during 1910-1916.	Deaths reduced to a standard of 100
January	81	139.7	58	81.2	51	120.6
February	72	137.9	45	70.0	41	106.4
March	64	110.3	62	86.7	39	92.2
April	42	74.2	77	111.9	37	90.0
May	39	67.2	81	113.3	33	78.0
June	38	67.2	61	88.2	31	75.7
July	41	70.7	54	75.5	33	78.0
August	30	51.7	59	82.5	32	75.7
September	42	74.1	62	89.5	38	92.2
October	74	127.4	115	160.8	57	134.8
November	74	132.7	92	132.9	57	139.5
December	86	148.2	76	106.3	49	115.8
TOTAL	683	--------	842	----------	498	--------

Explanation of the term of "reduced to a standard of 100." We have taken the number 100 and let it represent the average monthly number of deaths; for any month in which there occurred more or less than this average number the figures in the column captioned, "Deaths reduced to a standard of 100," will show above or below 100.0.

SCARLET FEVER IN MICHIGAN IN 1918 AND PRECEDING YEARS—GENERAL PREVALENCE.

In Table 31 is shown the prevalence of scarlet fever in Michigan during each of the years 1898 to 1918, inclusive. In the above mentioned table the number of cases and deaths, as reported to this department, is shown with the "cases per 100 deaths" and the "deaths per 100,000 estimated population." The years shown in this table have been divided, as far as possible, into five-year periods, for which is shown the annual average number of cases, deaths, deaths per 100 cases and the deaths per 100,000 population.

While the number of cases of scarlet fever reported to this department for the year 1918 showed a great decrease over the number reported during the previous year, the deaths also were 48 per cent less than they were in 1917. There were reported to this department during the year 1918, 5,944 cases and 173 deaths from this disease. These 173 fatal cases correspond to a death rate of 5.5 per 100,000 population. This death rate of 5.5 for 1918 is 23.6 per cent lower than the annual average death rate for the years 1913 to 1917, inclusive.

During the year 1917 there were reported to this department 14,322 cases and 334 deaths. This number of cases is an increase of nearly 300 per cent over that of the annual average for the years 1910-1914. The deaths for this year show an increase of 50 per cent over that of the average for 1910-1914. This epidemic was present in both the rural and urban districts of the State, and the increase in the number of reported cases, deaths and the death rates per 100,000 population is approximately the same. However, in comparing this year with 1918, we find that for the last mentioned year a great decrease is noted in both the reported cases and deaths, for the State as a whole, and also in the urban and rural districts. However, the greatest decrease will be found in the urban districts (as is shown in one of the following tables).

While the annual average number of cases for the years 1915-1918 exceed those for the years 1910-1914, it will be noticed that the number of deaths from this disease, for this last period of years, is less than those of the former one. This not only holds true for the State as a whole, but for the urban and rural districts as well.

In referring to Table 34, which shows the deaths by age groups, it will be noted that the greatest number of deaths occurring from this disease is among children under 5 years of age, and any great increase or decrease in the prevalence of scarlet fever is among the children of this age. In comparing the death rates of children under 5 years of age, for the year 1918, with any of the previous years shown in this table, it will be noted that the rate for this year is the lowest of any of the years shown. As this is a children's disease, it would lead us to believe that the work "of better babies and healthier children under the school age" campaign was beginning to show good results.

In Table 35 is shown the prevalence of this disease by months. It will be seen from this table that January, February, March, April and May are the months in which scarlet fever is most prevalent.

TABLE 31.—*Showing the prevalence of scarlet fever in Michigan in each of the thirty-five years, 1898-1918, inclusive.*

Years.	*Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1898	2,409	91	3.8	3.9
1899	4,345	144	3.3	6.0
1900	6,734	272	4.0	11.2
1901	7,726	312	4.0	12.7
1902	6,582	277	4.2	11.2
Average, 1898-1902	**5,559**	**219**	**3.9**	**9.1**
1903	5,353	200	3.7	8.0
1904	4,088	210	5.1	8.3
1905	2,286	123	5.4	4.8
1906	3,066	227	7.4	8.8
1907	2,514	159	6.3	6.1
Average, 1903-1907	**3,461**	**184**	**5.3**	**7.2**
1908	3,087	194	6.3	7.4
1909	5,153	275	5.3	10.3
1910	6,501	297	4.6	10.6
1911	5,177	208	4.0	7.3
1912	4,533	186	4.1	6.4
Average, 1908-1912	**4,890**	**232**	**4.7**	**8.4**
1913	4,140	281	6.8	9.5
1914	3,769	179	4.7	6.0
1915	3,402	110	3.2	3.6
1916	6,932	176	2.5	5.4
1917	14,322	334	2.3	10.8
Average, 1913-1917	**6,513**	**218**	**3.3**	**7.2**
1918	5,944	173	2.9	5.5

* From many localities only the fatal cases were reported, so that the figures in this column do not represent the number of cases that actually occurred.

SCARLET FEVER IN CITIES OF MICHIGAN OF 10,000 INHABITANTS OR OVER.

As indicated by the death rates, as shown in Table 32, scarlet fever during the year 1918 was more prevalent in the cities having 25,000 to 50,000 population than it was in either one of the other two classes. The prevalence, as indicated by the death rates, was practically the same in our largest cities as it was in the cities having from 10,000 to 25,000 inhabitants. The death rate for these cities was about 50 per cent less than the rate for the cities included in the middle class. The extremely high rate for the cities of the middle class for the year 1918 was caused by the extraordinary high rate experienced by the city of Jackson, whose rate was 68.3 per cent per 100,000 estimated population, this rate being over ten times the rate for the State as a whole.

The cities having an extremely high death rate for 1918, as compared with the State (5.5 per cent), or as compared with the average rate for all the cities shown in this table (7.6 per cent), were Jackson 68.3 per cent; Marquette, 31.5; Flint, 13.3; Menominee, 11.6, and Ironwood, 20.2. The cities in which no deaths were credited were Bay City, Kalamazoo, Adrian, Ann Arbor, Escanaba, Manistee, Pontiac, Sault Ste. Marie and Traverse City. The cities enjoying a rate which was lower than that for the State as a whole were Grand Rapids, 1.5 per cent; Saginaw, 1.7; Port Huron, 5.4, and Muskegon, 3.7.

TABLE 32.—*Showing the cases, deaths and the death rates, per 100,000 population, from scarlet fever in cities of Michigan having 10,000 inhabitants or over, during the years 1918, 1917, 1916, and also the averages for the years 1900-1915, inclusive.*

Cities.	1918.			1917.			1916.			Average, 1900-1915.		
	Cases.	Deaths.	Deaths per 100,000 population.	Cases.	Deaths.	Deaths per 100,000 population.	Cases.	Deaths.	Deaths per 100,000 population.	Cases.	Deaths.	Deaths per 100,000 population.
Cities over 50,000 inhabitants	2,204	55	6.4	6,731	162	11.2	2,754	65	4.5	1,529	93	14.0
Detroit	1,613	44	7.1	5,304	144	24.4	1,932	57	10.0	961	78	16.9
Grand Rapids	339	2	1.5	414	3	2.3	483	2	1.6	347	12	10.7
Saginaw	61	1	1.7	359	2	3.5	242	4	7.2	190	2	3.9
Flint	191	8	13.3	654	13	22.7	97	2	3.7	31	1	2.7
Cities from 25,000 to 50,000 inhabitants	791	31	13.0	1,608	25	11.0	982	26	12.3	421	13	6.6
Battle Creek	90	2	6.5	183	3	9.9	74	....	....	54	1	4.1
Bay City	157	....	....	99	2	4.1	23	4	8.3	164	7	15.7
Jackson	408	25	68.3	171	5	13.9	210	5	14.1	32	1	3.2
Kalamazoo	32	....	....	102	2	4.0	93	3	6.1	64	2	5.1
Lansing	93	3	6.9	1,031	12	28.6	263	3	7.4	30	1	3.2
Muskegon	11	1	3.7	22	1	3.8	319	11	42.1	77	1	4.2
Cities from 10,000 to 25,000 inhabitants	506	11	6.1	1,087	32	17.3	309	11	6.2	232	10.8	5.6
Adrian	....	....	....	1	1	8.7	....	....	....	2	.3	2.8
Alpena	18	1	7.4	36	1	7.5	14	1	7.5	12	.5	3.9
Ann Arbor	40	....	....	157	2	13.3	42	1	6.6	23	.5	3.4
Escanaba	47	....	....	94	6	37.4	105	5	32.1	14	1.0	7.5
Ironwood	117	3	20.2	186	7	47.6	46	1	6.9	15	3.0	23.6
Ispheming	48	1	9.3	168	5	42.2	5	....	....	29	1.0	8.2
Manistee	2	....	....	26	2	18.1	4	....	....	34	1.0	8.2
Marquette	58	4	31.5	61	....	....	10	....	....	14	1.0	8.7
Menominee	59	1	11.6	2	....	....	....	....	....	11	.5	4.7
Pontiac	111	....	....	312	5	27.8	9	....	....	24	1.0	6.9
Port Huron	2	1	5.4	27	3	16.1	67	3	16.1	26	.5	2.6
Sault Ste. Marie	3	....	....	15	....	....	4	....	....	9	.3	2.4
Traverse City	1	....	....	2	....	....	3	....	....	19	.2	1.6

THE PREVALENCE OF SCARLET FEVER IN THE RURAL AND URBAN DISTRICTS OF MICHIGAN DURING EACH OF THE YEARS 1905-1918.

Table 33 shows the number of reported cases and deaths, also the death rates, per 100,000 population, in the urban and rural localities of Michigan for each of the years 1905 to 1918, inclusive. The annual average for five-year periods is also shown.

The annual average for the years of the first period, or from 1905 to 1909, for the State as a whole, for the urban and the rural districts, were as follows: Cases, 3,221, 1,832 and 1,389; deaths, 196, 120 and 76, while the death rate per 100,000 of their corresponding population was: State, 7.5 per cent; urban, 11.2, and rural, 4.7. In comparing the second period of years (1910-1914) with that of the former period, we find that for the State as a whole the cases increased 50 per cent, the deaths 17.6 per cent, while the death rate increased from 7.5 to 8.0 per cent per 100,000 population. This increase is equivalent to an increase of 6.7 per cent. The rates for the urban districts for these two periods show that the annual average of the latter period is 8 per cent less than that of the first period, while the rates for the rural districts for these two periods show an increase of 29.8 per cent in the latter rate over that of the former one.

For the years 1915-1918, inclusive, the number of cases reported to this department increased the annual average number of cases for these four years to 7,650, which is an increase of 2,826, or 58.5 per cent over the annual average number for the previous five years. Although the number of cases increased, the number of deaths decreased 32, which is equivalent to a decrease in the death rate, per 100,000 population, of 25 per cent. In the urban and rural districts, as between the last four years and the previous five years, the number of cases reported from each of these districts shows the annual average for the last period to be greater than that of the former one, while the number of cases increased during the years 1915-1916, as compared with 1910-1914, the number of deaths decreased in each one of the districts. The decrease in the death rates for the period 1915-1918 over that of the former five years was: Urban, 6.8 per cent and the rural districts 41.9 per cent. As for the year 1918, we find that in both the rural and urban districts the death rate from this disease is considerably lower than that of the annual average for the years 1915-1918, inclusive, for same localities.

TABLE 33.—*Showing the number of cases, deaths and death rates, per 100,000 estimated population, from scarlet fever in the State, as a whole, in the urban and rural localities for each of the years 1905 to 1918, inclusive.*

Years.	State.			Urban Districts.			Rural Districts.		
	Cases.	Deaths.	Death rates.	Cases.	Deaths.	Death rates.	Cases.	Deaths.	Death rates.
1905	2,286	123	4.8	889	50	5.1	1,397	73	4.5
1906	3,066	227	8.8	1,501	139	13.5	1,565	88	5.5
1907	2,514	159	6.1	1,547	114	10.6	967	45	2.8
1908	3,087	194	7.4	2,070	124	11.1	1,017	70	4.3
1909	5,153	275	10.3	3,145	173	15.0	2.008	102	6.3
Annual average 1905-1909	**3,221**	**196**	**7.5**	**1,832**	**120**	**11.2**	**1,389**	**76**	**4.7**
1910	6,501	297	10.6	3,730	183	15.1	2,771	114	7.1
1911	5,177	208	7.3	4,041	105	8.3	1,136	103	6.5
1912	4,533	186	6.4	2,650	93	7.2	1,883	93	5.8
1913	4,140	281	9.5	2,563	178	13.3	1,577	103	6.5
1914	3,769	179	6.0	2,202	107	7.8	1,567	72	4.5
Annual average 1910-1914	**4,824**	**230**	**8.0**	**3.037**	**133**	**10.3**	**1,787**	**97**	**6.1**
1915	3,402	110	3.6	1,947	51	3.6	1,455	59	3.7
1916	6,932	176	5.4	4,345	111	7.7	2,587	65	4.0
1917	14,322	334	10.8	9,426	219	17.6	4,896	115	6.2
1918	5,944	173	5.5	3,501	97	7.6	2,443	76	4.1
Annual average 1915-1918	**7,650**	**198**	**6.4**	**4,805**	**119**	**9.6**	**2,845**	**79**	**4.3**

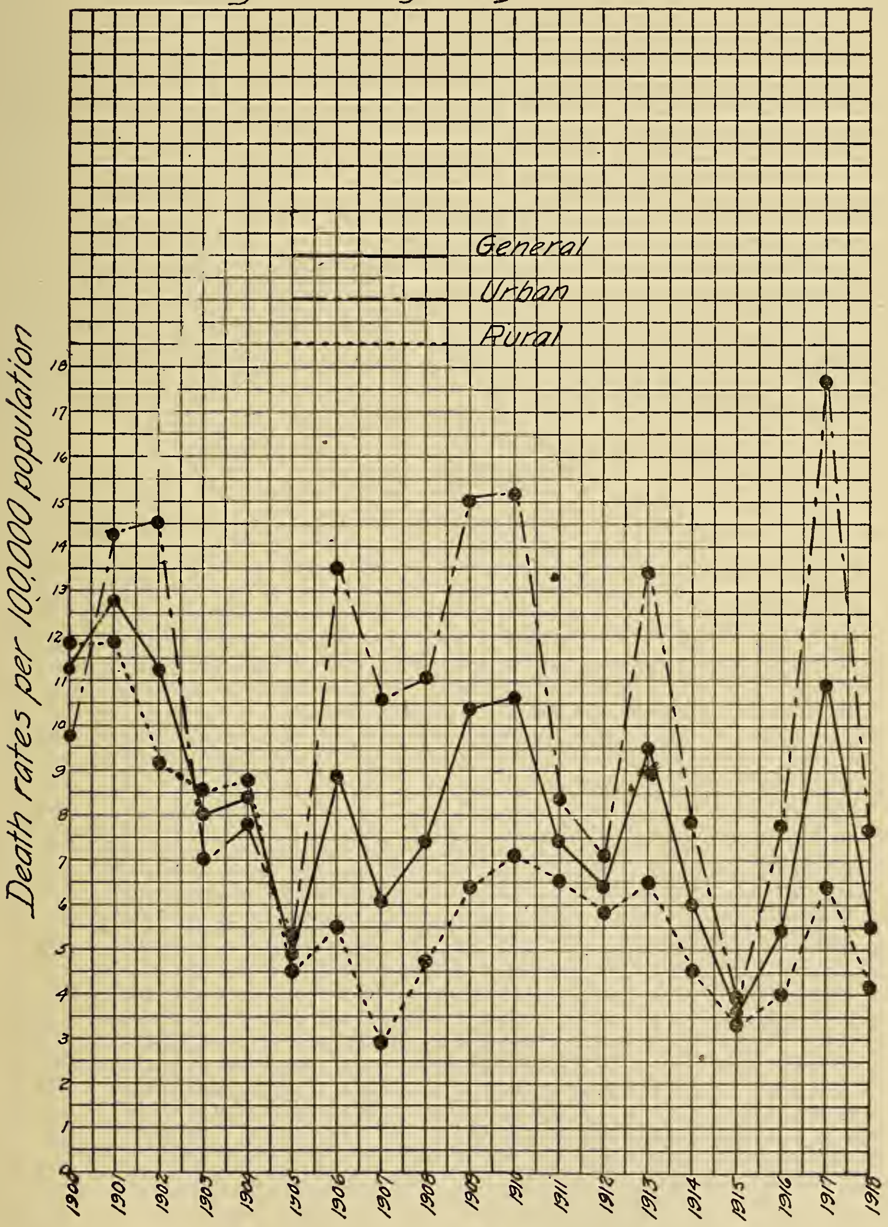


Diagram showing the fatality of Scarlet Fever in Michigan during the years 1900-1918.

AGE DISTRIBUTION OF SCARLET FEVER.

In the following table is shown the age distribution of the fatal cases of scarlet fever in this State, as indicated by the number of deaths and death rates per 100,000 estimated population from this disease during the years 1918, 1917, 1916 and the annual average for the years 1898-1915.

As will be seen by referring to the data shown in this table, it may be noted that this disease shows the greatest prevalence among children under 10 years of age. In making a comparison of any of the years shown in this table with the annual average for the years 1898-1915, it will be noticed that the rates, at the various ages, for the years 1916 and 1918 are lower than those for the years 1898-1915. However, for the year 1917, which was an epidemic year, the rates for each of the age groups show a decided increase over those for 1898-1915.

In comparing the death rate, per 100,000 estimated population of corresponding age, for the year 1918 with those of the annual average for 1898-1915, we find that the decrease, in per cent for 1918, as compared with that of the former period, is for all ages 32.1 per cent; under one year, 53.7 per cent; under five years, 52.4 per cent, and for the age group, 5 to 9 years, a decrease of 14 per cent is noted.

TABLE 34.—*Showing the age distribution of the fatal cases of scarlet fever in Michigan, as indicated by the number of deaths and death rates, per 100,000 population of the same age, at each age group in 1918, 1917 and 1916; also the average number of deaths and death rates at each age group during the years 1898-1915, inclusive.*

	1918.		1917.		1916.		Average, 1898-1915.	
	The total number of deaths during the year 1918.	Death rates per 100,000 population of samo age.	The total number of deaths during the year 1917.	Death rates per 100,000 population ef same age.	The total number of deaths during the year 1916.	Death rates per 100,000 population of same age.	Average annual number of deaths during the years 1898-1915.	Death rates per 100,000 population of same age.
ALL AGES	**173**	**5.5**	**334**	**10.8**	**176**	**5.4**	**208**	**8.1**
Under 1 year	8	11.8	16	23.8	13	19.6	15	25.5
Under 5 years	65	19.7	155	47.5	71	22.0	114	41.4
5 –9 years	54	19.0	83	29.4	44	15.6	60	22.1
10–19 years	29	5.2	41	7.3	26	4.7	24	4.6
20–29 years	17	3.0	35	6.2	17	3.0	7	1.6
30–39 years	8	1.8	10	2.2	1	0.2	3	0.7
40–49 years	....	....	7	2.0	4	1.1	1	0.3
50–59 years	....	....	1	0.5	....	....	0.4	0.1
60–69 years	....	....	1	0.6	....	....	0.2	0.2
70–79 years	....	....	....	....	....	....	....	....
80 years and over	....	....	....	....	....	....	0.1	0.7
Unknown	....	....	1	....	....	....	0.2	....

THE SEASONABLE PREVALENCE OF SCARLET FEVER.

In Table 35 is shown the seasonal prevalence of scarlet fever during each of the years 1918, 1917, 1916, also the annual average for the years 1898-1915, inclusive.

In the column captioned "the per cent of monthly deaths as compared with the monthly average," we have let the average monthly number of deaths equal 100 per cent, so by comparing the data shown in this column with 100 per cent, it can readily be seen that the months of January, February, March, April and May are the months in which this disease claims the greatest number of deaths, while the least prevalency is shown during the warmer months.

For the year 1918 the months showing the greatest increase over that of the annual average for the years 1898-1915, are February, April and May, while the months from June to December show a decrease. The month in which the least number of deaths occurred was September.

TABLE 35.—*Showing the seasonal prevalence of scarlet fever in Michigan, as indicated by the number of deaths from this disease in each month of the years 1918, 1917 and 1916, also the average number of deaths occurring in each of the months during the years 1898-1915, inclusive. Also showing the per cent of deaths occurring in each of the months as compared with the average monthly number, the average monthly per cent being 100.*

Months.	1918.		1917.		1916.		Average, 1898-1915.	
	The number of deaths occurring in each month during the year 1918.	The per cent of monthly deaths as compared with the monthly average.	The number of deaths occurring in each month during the year 1917	The per cent of monthly deaths as compared with the monthly average.	The number of deaths occurring in each month during the year 1916.	The per cent of monthly deaths as compared with the monthly average	Average number of deaths occurring in each month during the years 1898-1915.	The per cent of monthly deaths as compared with the monthly average.
January	22	149.7	34	119.7	19	126.7	26	144.4
February	29	211.0	38	147.9	20	146.7	23	138.9
March	18	122.5	53	186.6	12	80.0	27	150.0
April	30	211.0	46	167.3	15	100.0	21	122.2
May	25	170.2	42	148.0	12	80.0	20	111.1
June	11	77.6	42	151.4	17	120.0	13	74.4
July	4	27.2	7	24.6	11	73.3	10	55.6
August	6	40.8	12	42.3	4	26.7	10	55.6
September	2	13.6	9	31.7	4	26.7	9	50.0
October	8	54.4	13	45.8	8	53.3	13	74.4
November	9	63.3	17	63.4	21	146.7	18	105.5
December	9	61.2	21	73.9	33	220.0	21	116.6
Total	173	100.0	334	100.0	176	100.0	211	100.0

MEASLES IN MICHIGAN IN 1918 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1918 there were reported to this department 6,726 cases of measles, of which number 259, or 3.9 per cent, proved fatal. These 259 deaths from this disease correspond to an annual death rate of 8.3 per cent per 100,000 estimated population.

In the following table are shown the number of reported cases, deaths and death rates per 100,000 population for each of the years 1898-1918, inclusive. The annual average number of cases, deaths and death rates is also given for five-year periods.

In comparing the year 1918 with the annual average for the years 1913-1917, it will be noted that the number of reported cases are considerably less during this year, while the number of deaths show an increase of 14.6 per cent and the death rate 9.2 per cent for 1918, as compared with the annual average for the previous five years.

In the following tables are shown the number of deaths occurring in each of the cities of the State (constituting the urban districts), by age groups and by months, which may be studied in conjunction with the following table:

TABLE 36.—*Showing the prevalence of measles in Michigan during each of the years 1890-1918, inclusive.*

Years.	*Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1898	11,614	131	1.1	5.6
1899	12,005	187	1.6	7.8
1900	20,403	342	1.7	14.1
1901	4,629	79	1.7	3.2
1902	11,978	238	2.0	9.6
Average 1898-1902	**12,126**	**195**	**1.6**	**8.1**
1903	8,941	176	2.0	7.0
1904	10,386	194	1.9	7.7
1905	6,061	123	2.0	4.8
1906	7,403	251	3.4	9.7
1907	12,139	256	2.1	9.8
Average 1903-1907	**8,986**	**200**	**2.2**	**7.8**
1908	4,775	121	2.5	4.6
1909	9,047	270	3.0	10.1
1910	13,934	251	1.8	8.9
1911	9,639	200	2.1	7.0
1912	2,834	118	4.2	4.1
Average 1908-1912	**8,046**	**192**	**2.4**	**6.9**
1913	9,185	253	2.8	8.6
1914	11,356	177	1.6	5.9
1915	4,438	104	2.3	3.4
1916	12,143	354	2.9	11.6
1917	14,472	252	1.8	8.2
Average 1913-1917	**10,319**	**226**	**2.2**	**7.6**
1918	6,726	259	3.8	8.3

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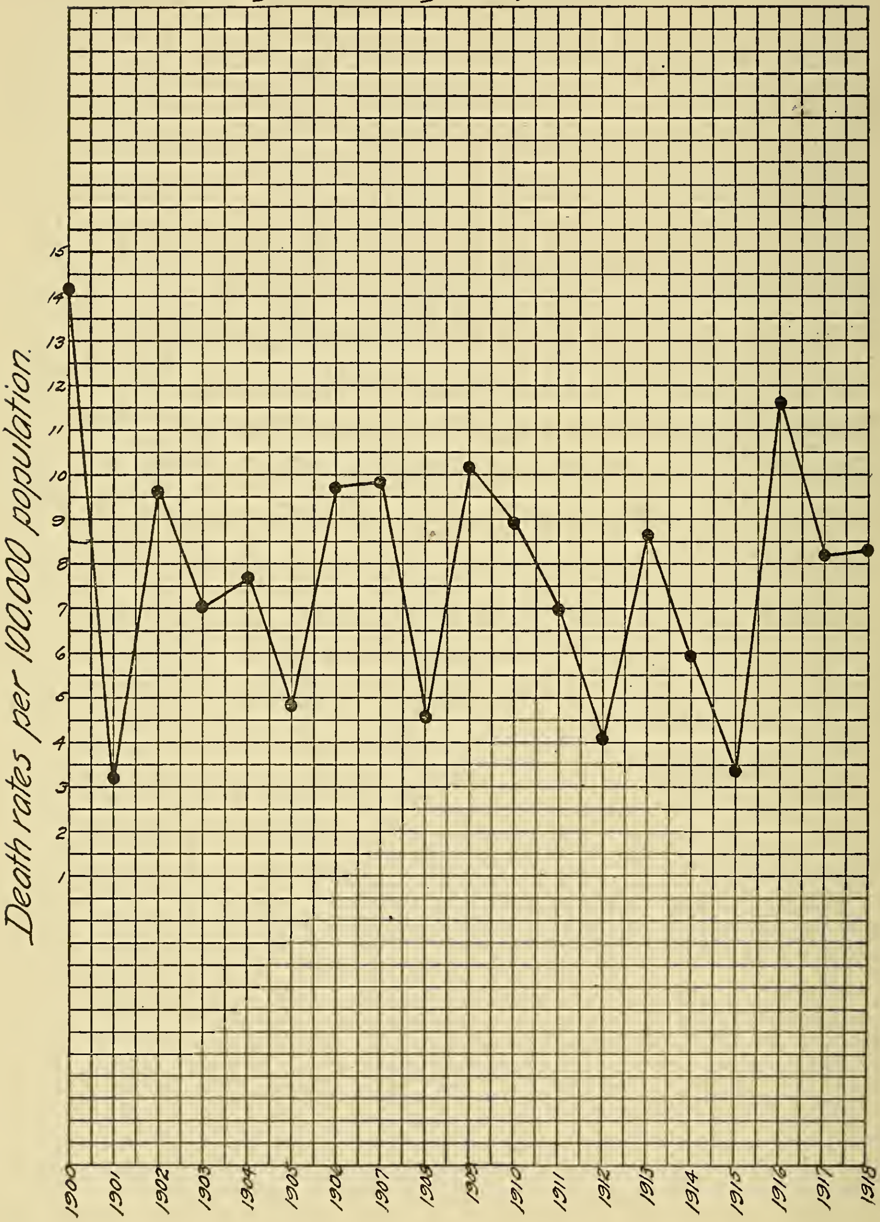
*From many localities only the fatal cases are reported so that the figures in this column do not represent the number of cases that actually occurred.

Diagram showing the fatality of Measles in Michigan during the years 1900-1918.



MEASLES IN CITIES OF 10,000 INHABITANTS AND OVER.

In Table 37 may be seen the prevalence of measles in certain cities of Michigan having 10,000 or more inhabitants during the years 1918, 1917, 1916, also the average for the years 1905-1915, inclusive.

In comparing the death rates for each of the cities shown in this table, for the years 1918, 1917 and 1916, with the annual average for 1905-1915, it will be noted that in two-thirds of the instances the rates for these cities compare very favorably with their annual average rates for the years 1905-1915.

During the year 1918 the cities experiencing a higher rate than that of the average for the years 1905-1915, together with their rates, were: Detroit, 20.6 per cent; Saginaw, 7.0; Battle Creek, 12.9; Adrian, 8.5; Ann Arbor, 13.3, and Port Huron, 10.7. While the cities whose rate does not compare very favorably with that for the State (8.3) were Detroit (20.6), Battle Creek (12.9), Ann Arbor (13.3) and Port Huron (10.7), however, it should be taken into consideration that, especially in the smaller cities, an increase of one or possibly two deaths in any one year would greatly affect the rate for that city, and in some of the cities, especially the city of Detroit, their respective rates would differ from those given in the following table, if the correct population were available.

Of the twenty-two cities shown in Table 37, it will be noted that ten of them did not report a fatal case of this disease during 1918, while nine of them reported only one and two deaths occurring in their respective localities.

TABLE 37.—*Showing the deaths and death rates, per 100,000 population, from measles in cities in Michigan having 10,000 inhabitants or over during the years 1918, 1917, 1916, and also the averages for the years 1905-1915.*

	1918.		1917.		1916.		Average, 1905-1915.	
	Deaths.	Deaths per 100,000 population.	Deaths.	Deaths per 100,000 population.	Deaths.	Deaths per 100,000 population.	Deaths.	Deaths per 100,000 population.
Cities over 50,000 inhabitants	130	15.2	91	10.9	148	18.3	56	8.4
Detroit	125	20.6	55	9.3	127	22.2	45	10.2
Grand Rapids	1	.7	33	25.2	3	2.3	5	4.8
Saginaw	4	7.0	......	......	6	10.8	2	4.0
Flint	......	......	3	5.2	12	21.9	2	5.5
Cities of 25,000 to 50,000 inhabitants	10	4.2	12	5.1	26	11.4	14.5	7.4
Battle Creek	4	12.9	......	......	1	3.4	2	8.1
Bay City	......	......	......	......	16	33.4	7	15.5
Jackson	1	2.7	3	8.3	3	8.5	1.5	4.8
Kalamazoo	2	3.9	1	2.0	......	......	2	5.2
Lansing	2	4.6	1	2.4	3	7.4	1	3.0
Muskegon	1	3.7	7	2.6	3	11.5	1	4.0
Cities of 10,000 to 25,000 inhabitants	6	3.5	10	5.8	24	13.5	10.2	5.3
Adrian	1	8.5	......	......	3	26.2	.3	2.7
Alpena	......	......	2	14.9	1	7.5	1	7.7
Ann Arbor	2	13.3	1	6.6	......	......	.2	1.3
Escanaba	......	......	......	......	3	19.2	1	7.0
Ironwood	......	......	......	......	3	20.6	1	7.4
Ispheming	......	......	......	......	2	16.7	2	16.5
Manistee	......	......	......	......	3	26.8	1	8.5
Marquette	......	......	1	8.0	2	16.1	.5	4.2
Pontiac	......	......	1	5.6	5	28.5	.7	4.5
Port Huron	2	10.7	1	5.4	2	10.7	1	5.3
Sault Ste. Marie	1	7.0	4	28.3	......	......	.7	5.3
Traverse City	......	......	......	......	......	......	.8	6.2

AGE DISTRIBUTION OF MEASLES.

In the following table is shown the age distribution of the fatal cases of measles for the years 1898-1918. As will be seen by this table, this disease is more prevalent among the children whose ages are "under one year of age" than it is at any of the other age groups shown.

The death rates for children "under one year of age" fluctuate considerably, while those whose ages are "under five years" remain very much the same. This will also be found to be true with all of the age groups of from 5-9 to 60-69 years. Of the 191 deaths among children under five years of age, 78 or 40.8 per cent were children whose ages were "under one year," while 113 deaths were distributed among the children whose ages ranged from 1 to 4 years.

TABLE 38.—*Showing the age distribution of fatal cases of measles in Michigan, as indicated by the number of deaths and death rates, per 100,000 population, from this disease at each age group in 1918, 1917, 1916, and the average number of deaths and death rates at each age group during the years 1898-1915, inclusive.*

Age groups.	1918.		1917.		1916.		Average, 1898-1915.	
	The total number of deaths during the year 1918.	Death rates per 100,000 population of same age.	The total number of deaths during the year 1917.	Death rates per 100,000 population of same age.	The total number of deaths during the year 1916.	Death rates per 100,000 population of same age.	Average annual number of deaths during the years 1898-1915.	Death rates per 100,000 population of same age.
ALL AGES	259	8.3	252	8.2	354	11.6	194	7.4
Under 1 year	78	114.7	59	87.6	109	165.6	49	81.7
Under 5 years	191	57.9	192	58.9	291	90.3	144	51.5
5 –9 years	30	10.5	27	9.6	25	8.9	20	7.5
10–19 years	9	1.6	18	3.2	18	3.3	14	2.7
20–29 years	20	3.5	6	1.1	6	1.1	7	1.6
30–39 years	5	1.1	5	1.1	6	1.3	5	1.4
40–49 years	3	.8	2	0.6	4	1.1	3	1.1
50–59 years	....	....	2	0.7	1	0.4	1	0.6
60–69 years	1	.6	....	....	2	1.1	.4	0.3
70–79 years	....	....	....	....	1	1.2	.7	0.9
80 and over	....	....	....	....	....	....	.2	1.1
Unknown	....	....	....	....	....	....	.2	....

THE SEASONAL PREVALENCE OF MEASLES.

The months in which measles is the most prevalent can readily be determined by the data shown in the following table. As will be seen from this table, the months of January, February, March, April, May and June are the months in which this disease shows the greatest prevalency.

In Table 39 is shown the number of deaths and the per cent of monthly deaths as compared with the monthly average number of deaths, for the years 1918, 1917 and 1916, also the average for the years 1898-1915, inclusive. We have let 100.0 per cent equal the number of deaths occurring in an average month, so that in comparing the per cents of the various months with one another it can readily be seen that the months of late winter and early spring are the ones in which the greatest prevalency of this disease occurs.

TABLE 39.—*Showing the seasonal prevalence of measles in Michigan, as indicated by the number of deaths from this disease in each month during the years 1918, 1917, 1916, and also the average number of deaths in each month during the years 1898-1915, inclusive. Also showing the per cent of deaths occurring in each of the months as compared with the average monthly number, the average monthly per cent being 100.0.*

Months.	1918.		1917.		1916.		Average, 1898-1915.	
	The number of deaths occurring in each month during the year 1918.	The per cent of monthly deaths as compared with the monthly average.	The number of deaths occurring in each month during the year 1917	The per cent of monthly deaths as compared with the monthly average.	The number of deaths occurring in each month during the year 1916.	The per cent of monthly deaths as compared with the monthly average	Average number of deaths occurring in each month during the years 1898-1915.	The per cent of monthly deaths as compared with the monthly average.
January	18	81.8	14	65.4	20	66.7	16	97.0
February	33	163.6	22	113.6	21	76.7	18	121.2
March	32	145.5	29	135.5	57	190.0	27	163.6
April	37	172.7	40	191.6	89	306.7	30	187.9
May	62	281.8	56	261.7	65	216.7	33	200.0
June	31	145.5	34	163.6	38	130.0	23	145.5
July	18	81.8	18	84.1	21	70.0	14	84.8
August	6	27.3	5	23.4	18	60.0	7	42.4
September	1	4.5	1	10.7	7	23.3	3	18.2
October	7	31.8	4	18.7	5	16.7	4	24.2
November	10	45.4	7	32.8	4	13.3	7	42.4
December	4	18.2	22	102.3	9	30.0	12	72.2
Total	**259**	**100.0**	**252**	**100.0**	**354**	**100.0**	**194**	**100.0**

WHOOPING COUGH IN MICHIGAN IN 1918 AND PRECEDING YEARS—GENERAL PREVALENCE.

During the year 1918 there were reported to the Michigan State Board of Health 2,563 cases of whooping cough, of which number 479, or 18.7 per cent were reported as being fatal. These 479 deaths from this disease correspond to a death rate of 15.3 per 100,000 estimated population, which is the highest death rate from this disease since 1906.

During the years 1917 and 1918 a considerable increase in the number of reported cases is noted. However, as all localities do not report the non-fatal cases, the figures in this column should not be considered in determining the prevalence of whooping cough in any one year or period of years with another. As all deaths are reportable to this department by law, the figures in the column captioned "deaths per 100,000 population," are the ones that should be used in determining the prevalence of this disease.

In comparing the prevalence of whooping cough during the years 1917 and 1918 with the annual average (9.1) for the years 1913 to 1917, inclusive, a great increase is noted. This is especially true for the year 1918. The increase in the death rate for these two years over that of the average (9.1) for 1913-1917, is 26.4 and 68.1 per cent, respectively. As the annual average for the years 1913-1917 compares very favorably with the other five-year averages, since 1897, what has been said regarding the prevalence of this disease during 1917 and 1918, as compared with the annual average for 1913-1917, is equally true for the other five-year averages.

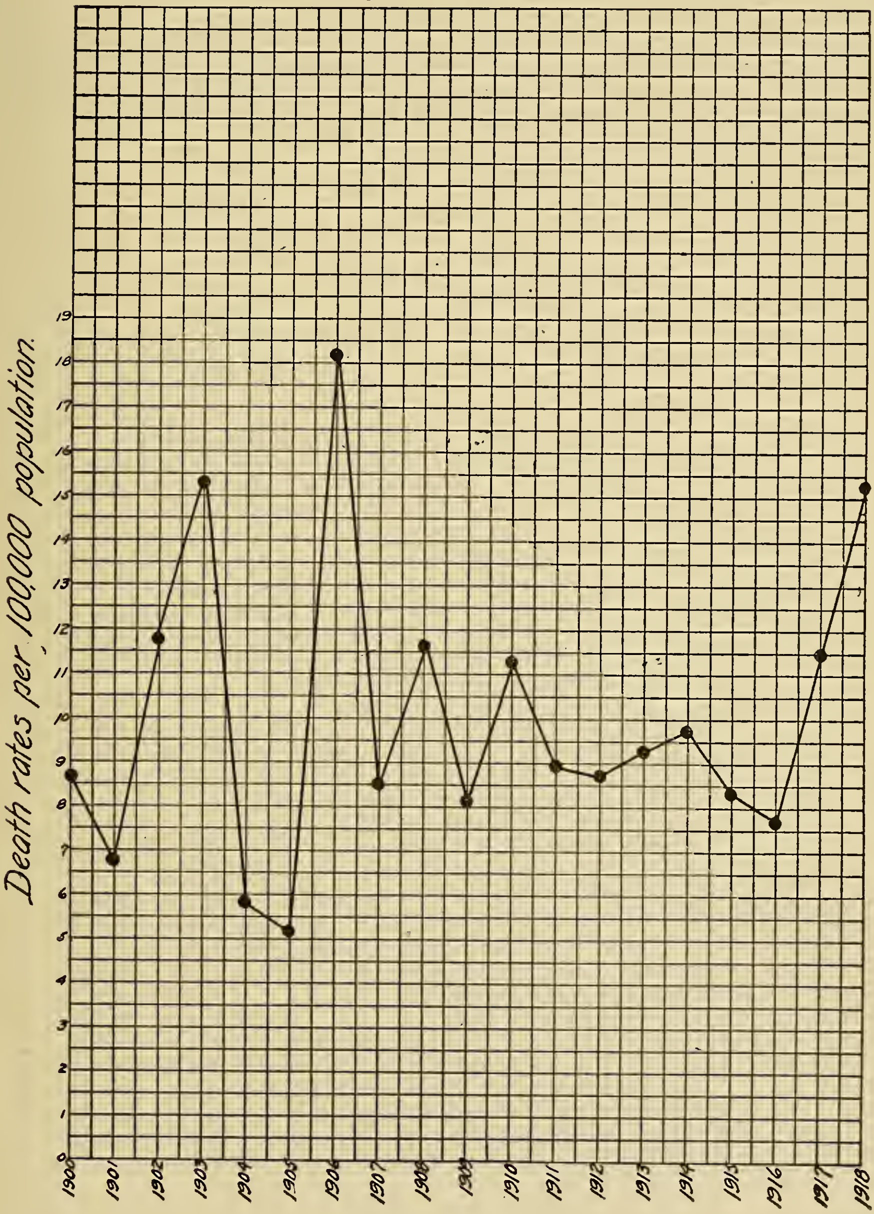
In the two following tables is shown the number of deaths from this disease by months and by age groups for the years 1916, 1917 and 1918, also the annual average for the years 1900-1915. The data shown in the two above mentioned tables should be studied in conjunction with that shown in the following table:

TABLE 40.—*Showing the prevalence of whooping cough in Michigan during each of the thirty-three years, 1886-1918.*

Years.	*Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1886	2,642	62	2.3	3.2
1887	2,267	59	2.6	2.0
1888	2,502	49	2.0	2.4
1889	2,694	41	1.5	2.0
1890	983	20	2.0	1.0
1891	2,360	101	4.3	4.7
1892	3,188	77	2.4	3.6
1893	4,047	134	3.3	6.1
1894	4,555	123	2.7	5.5
1895	4,284	109	2.5	4.8
1896	5,466	91	1.7	4.0
1897	3,978	72	1.8	3.1
Average 1886-1897	**3,247**	**78**	**214**	**3.6**
1898	5,300	282	5.3	12.0
1899	6,509	238	3.7	10.0
1900	3,397	208	6.1	8.6
1901	2,955	163	5.5	6.7
1902	3,534	289	8.2	11.7
Average 1898-1902	**4.339**	**236**	**5.4**	**9.8**
1903	4,172	383	9.2	15.3
1904	1,779	148	8.3	5.8
1905	1,196	131	11.0	5.1
1906	1,364	469	34.4	18.1
1907	872	223	25.6	8.5
Average 1903-1907	**1.877**	**271**	**14.4**	**10.6**
1908	1,248	305	24.4	11.6
1909	1,054	217	20.6	8.1
1910	1,136	318	28.0	11.3
1911	1,897	254	13.4	8.9
1912	1,255	252	20.0	8.7
Average 1908-1912	**1.318**	**269**	**20.4**	**9.7**
1913	929	276	29.7	9.3
1914	1,822	290	15.9	9.7
1915	2,258	234	10.4	7.8
1916	1,837	221	12.0	7.2
1917	3,211	353	11.5	11.5
Average 1913-1917	**2,011**	**273**	**13.6**	**9.1**
1918	2,563	479	18.7	15.3

* From many localities only fatal cases were reported, so that the figures in this column do not represent the number of cases that actually occurred.

Diagram showing the prevalence of Whooping-Cough in Michigan during the years 1900-1918.



THE SEASONAL PREVALENCE OF WHOOPING COUGH.

As will be seen by the data shown in the following table, of the average for the years 1900-1915, the maximum prevalence of this disease is reached during the months of March and May, inclusive, although the months of February, June, July and August are above the average (100.0).

Although, according to the following table, it is true that the prevalency of whooping cough does not reach its maximum or minimum during the same months for each of the years shown in this table, the tendency is that the maximum is reached during the spring and the minimum during the fall months.

TABLE 41.—*Showing the seasonal prevalence of whooping cough in Michigan, as indicated by the number of deaths from this disease occurring in each of the months during the years 1918, 1917, 1916, and also the average number of deaths occurring in each of the months for the years 1900-1915. Also showing the per cent of deaths occurring in each of the months as compared with the average monthly number of deaths.*

Months.	1918.		1917.		1916.		Average, 1898-1915.	
	The number of deaths occurring in each of the months during 1918.	Monthly deaths above or below the average. *	The number of deaths occurring in each of the months during year 1917	Monthly deaths above or below the average. *	The number of deaths occurring in each of the months during 1916.	Monthly deaths above or below the average. *	The average number of deaths occurring in each month during the years 1900-1915.	Monthly deaths above or below the average. *
January	41	100.7	14	46.7	23	122.3	20	90.9
February	46	125.6	15	56.7	24	140.5	22	104.5
March	51	125.6	17	56.7	14	74.3	28	127.3
April	66	167.1	21	73.3	23	126.6	26	122.7
May	54	132.7	25	83.3	27	142.5	29	131.4
June	33	83.5	22	76.7	18	100.0	22	104.5
July	36	88.5	40	133.3	15	79.8	24	110.8
August	28	68.8	61	203.3	30	158.5	24	110.8
September	25	63.9	37	126.7	16	90.4	19	90.9
October	50	122.9	32	106.7	13	69.1	15	68.2
November	30	76.2	27	93.3	7	37.9	15	70.5
December	19	46.7	42	140.0	11	58.5	15	68.2
Total	479	100.0	353	100.0	221	100.0	259	100.0

*The average considered in the above table as being 100.0.

AGE DISTRIBUTION OF WHOOPING COUGH.

Whooping cough, as indicated by the death rates shown in the following table, demands its greatest toll among children under one year of age. Any increase or decrease in the death rates, for all ages combined, affects the rate for children in this age group more than any of the other groups.

In comparing the death rate for children under one year of age for the year 1918 with the other years shown in the following table we find that the rate for this year was 8 per cent greater than for 1917, 91 per cent greater than 1916 and 35.7 per cent more than the annual average rate for the years 1900-1915. As for those of the next age group or those of 1 to 4 years, the death rate for 1918 shows an increase over the years 1917, 1916 and the annual average for the years 1900-1915 of 81 per cent, 138 per cent and 114 per cent, respectively.

TABLE 42.—*Showing the age distribution of fatal cases of whooping cough in Michigan, as indicated by the number of deaths and death rates, per 100,000 population, from this disease at each age group in 1918, 1917, 1916, and the average number of deaths and the death rates at each age group during the years 1900-1915.*

Ages.	1918.		1917.		1916.		Average. 1900-1915.	
	The total number of deaths during the year 1918.	Death rates per 100,000 population of same age.	The total number of deaths during the year 1917.	Death rates per 100,000 population of same age.	The total number of deaths during the year 1916.	Death rates per 100,000 population of same age.	Average annual number of deaths during the years 1900-1915.	Death rates per 100,000 population of same age.
ALL AGES	479	15.3	355	11.5	221	7.2	225	9.6
Under 1 year	252	370.6	230	343.2	130	194.0	163	273.1
1 –4 years	205	78.2	112	43.2	84	32.8	83	36.5
5 –9 years	14	4.9	10	3.5	6	2.1	8	2.9
10–19 years	6	1.1	....	....	1	0.18	2	0.3
20 years and over	2	0.2	3	0.2	....	....	1	0.06

SMALLPOX IN MICHIGAN IN 1918 AND PRECEDING YEARS.
GENERAL PREVALENCE.

As will be seen by reference to the data shown in Table 43 the prevalence of smallpox during the years 1917 and 1918 shows a considerable increase in the death rates as compared with the annual average for years 1913-1917, the increase being 300 and 350 per cent respectively. It is also noticeable that the number of reported cases for the years 1917 and 1918 increased in the same proportion as did the deaths. The "deaths per 100 cases" for these two remain the same.

The number of cases recorded during 1918 was the greatest number since 1904, while there were more deaths reported to this department during this year than in any year since 1910.

In the following table containing the cases of smallpox reported to this department during the years 1917 and 1918, is shown the number of persons afflicted with this disease, who had and had not ever been vaccinated and when:

Year.	Cases reported.	Vaccinated within 7 years.	Vaccinated over 7 years.	Never vaccinated.	Vaccinated after exposure.	Unknown.
1917.....	3,674	134	108	1,923	119	1,390
1918.....	5,241	96	166	3,052	326	1,601
Total..	**8,915**	**230**	**274**	**4,975**	**445**	**2,991**

From the data shown in the above table it will be noticed that out of 8,915 cases of this disease that were reported to this board during the two years, 1917 and 1918, 4,975, or 55.8 per cent, were reported as never having been vaccinated, while only 230, or 2.6 per cent, were reported as having been vaccinated within the seven-year period.

TABLE 43.—*Showing the prevalence of smallpox in Michigan during the years 1898-1918.*

Years.	Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1898	32	1	3.1	.04
1899	139	6	4.3	.3
1900	694	9	1.3	.4
1901	5,088	31	.6	1.3
1902	7,086	40	.6	1.6
Average 1898-1902	**2,608**	**17**	**.7**	**.7**
1903	6,341	33	.5	1.3
1904	5,753	24	.4	.9
1905	2,985	74	2.5	2.9
1906	1.240	3	.2	.1
1907	1,712	8	.5	.3
Average 1903-1907	**3,606**	**28**	**.8**	**1.1**
1908	2,306	8	.3	.3
1909	1,533	4	.3	.2
1910	3,319	120	3.6	4.3
1911	898	9	1.0	.3
1912	1,127	3	.3	.1
Average 1908-1912	**1,837**	**29**	**1.6**	**1.0**
1913	1,995	4	.2	.1
1914	1,527	1	.07	.03
1915	1,094	5	.5	.2
1916	1,581	2	.1	.07
1917	3,674	8	.2	.3
Average 1913-1917	**1,975**	**4**	**.2**	**.1**
1918	5,241	13	.2	.4

MENINGITIS IN MICHIGAN IN 1918 AND PRECEDING YEARS.

As indicated by the data shown in the following table, the death rates per 100,000 population, from meningitis have been steadily decreasing until for the year 1918 a rate of 8.7 per 100,000 population was reached. This rate is the lowest rate that this State has experienced for any of the years shown in the following table.

In comparing the death rate for 1918 with that of 1917, and also with that of the average annual rate for the years 1913-1917, we find that the rate for 1918 is 30.4 per cent less than that for 1917, and it is also 18.7 per cent less than the average annual rate for the years 1913-1917.

While fatal cases of this disease will be found at nearly every age, the greatest toll is taken among those of under five years of age, and for those who died of this disease under five years of age it is found that practically one-half of them have not reached their first birthday.

The months in which this disease is most prevalent are those of late winter and spring, and the least prevalent during the fall.

Years.	Deaths.	Deaths per 100,000 population.
1898	671	28.4
1899	1,051	44.0
1900	514	21.2
1901	427	17.4
1902	384	15.5
Average, 1898-1902	609	25.1
1903	382	15.3
1904	401	15.8
1905	460	18.0
1906	503	19.5
1907	569	21.8
Average 1903-1907	463	18.1
1908	480	18.2
1909	468	17.6
1910	526	18.7
1911	487	17.0
1912	423	14.6
Average 1908-1912	477	17.2
1913	358	12.1
1914	296	9.9
1915	276	9.2
1916	291	9.5
1917	387	12.5
Average 1913-1917	322	10.7
1918	271	8.7

ACUTE ANTERIOR POLIOMYELITIS (INFANTILE PARALYSIS) IN MICHIGAN IN 1918 AND PRECEDING YEARS.

The following table shows the general prevalence of this disease during the years 1910-1918:

Years.	Cases.	Deaths.	Deaths per 100,000 population.
1910	104	72	2.6
1911	68	35	1.2
1912	78	33	1.1
1913	56	29	1.0
1914	49	28	0 9
1915	95	34	1.1
1916	598	148	4.8
1917	91	37	1.2
1918	121	55	1.8

CHICKEN POX (VARICELLA) IN MICHIGAN IN 1917 AND 1918.

During the year 1917 there were reported to this department 2,434 cases and 7 deaths of this disease, while for 1918 there were 1,339 cases and 3 deaths reported from this disease.

ERYSIPELAS IN MICHIGAN IN 1917 AND 1918.

During the year 1917 reports were received relative to 471 cases and 203 deaths, and for the year 1918 the number reported was 311 cases and 130 deaths.

TETANUS (LOCKJAW) IN MICHIGAN IN 1917 AND 1918.

There were 27 and 23 fatal cases of tetanus reported to this department during the years 1917 and 1918, respectively.

MUMPS (PAROTITIS) IN MICHIGAN IN 1917 AND 1918.

During the year 1917 there were reported to this office 531 cases and 4 deaths from this disease, while during 1918 there were 4,089 cases, of which number there were no deaths reported.

CREMATIONS IN MICHIGAN DURING 1917 AND 1918.

During the years 1917 and 1918 there were reported to this department the names and other data pertaining to 40 and 144 persons cremated during this period. Of the 184 cremations reported during these two years 182 of them were reported from Detroit and two from Chicago, Ill.

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